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REPORT NO.: 214-MGA-2000-09
SAFETY COMPLIANCE TESTING FOR FMVSS NO. 214
"SIDE IMPACT PROTECTION"
INDICANT

Toyota Motor Corporation
2000 Toyota Avalon 4-Door XL Sedan
NHTSA NO: CY5102

MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 19, 2000

Report Date: January 21, 2000

FINAL REPORT

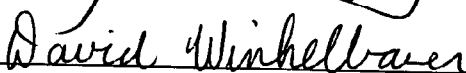
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SAFETY ASSURANCE
OFFICE OF VEHICLE SAFETY COMPLIANCE
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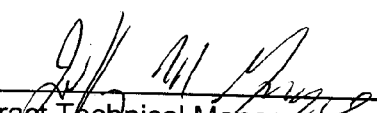
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9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		14. Sponsoring Agency Code NSA-30		15. Supplementary Notes																	
		12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 400 Seventh St., S.W., Room 6115 Washington, D.C. 20590		16. Abstract A 56/28 kph 90° Impact (Moving Deformable Barrier) INDICANT Compliance Test was conducted on the subject 2000 Toyota Avalon 4-Door XL Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP- 214D-05 Side Impact Protection (except the test was conducted 8 kph (5 mph) faster than the standard specified) for the determination of FMVSS No. 214 Side Impact Protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on January 19, 2000. The impact velocity of the Moving Deformable Barrier (MDB) was 62.0 kph, and the ambient temperature at the struck side of the target vehicle at the time of impact was 22°C. The target vehicle post test maximum crush was 381mm at level 2. The test vehicle's performance follows: <table border="1"> <thead> <tr> <th></th> <th><u>DRIVER.</u></th> <th><u>LEFT REAR PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>56</td> <td>47</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>50</td> <td>54</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>75</td> <td>55</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>66</td> <td>54</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>79</td> <td>89</td> </tr> </tbody> </table> The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.			<u>DRIVER.</u>	<u>LEFT REAR PASS.</u>	Left Upper Rib (LUR) Accel., g	56	47	Left Lower Rib (LLR) Accel., g	50	54	Lower Spine (T ₁₂) Accel., g	75	55	Thoracic Trauma Index (TTI)	66	54	Pelvis (PEV) Accel., g
	<u>DRIVER.</u>	<u>LEFT REAR PASS.</u>																			
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17. Key Words Compliance Testing Side Impact Protection FMVSS 214 Side Impact Dummy (SID) New Car Assessment Program (NCAP)		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. 202-366-4946																			
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SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 2000 FMVSS 214 Side Impact Protection Compliance Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-97-C-11033. The purpose of this test was to evaluate side impact protection of a 2000 Toyota Avalon 4-Door XL Sedan.

This side impact test was conducted in accordance with the Office of Vehicle Safety Compliance's FMVSS 214 test procedure (TP-214D-05, dated August 2, 1999) with the exception of the test speed, which was at the NCAP High Speed Lateral Impact level (61.2 kph, approximately 8 kph faster than compliance speed).

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 2000 Toyota Avalon 4-Door XL Sedan was impacted on the left side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.0 kph (38.5 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on January 19, 2000. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

Two Side Impact Dummies (SIDs) were placed in the left front and left rear designated seating positions according to instructions specified in the OVSC Side Impact Laboratory Test Procedure which is dated August 2, 1999. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T_{12}) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)
5. Head Center of Gravity triaxial accelerometers (X, Y, Z - direction)

Appendix B contains the vehicle and dummy response data traces. A summary of the side impact dummy (SID) configuration and performance verification test data is shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report.

The following table summarizes the results of the FMVSS 214 Left Side Impact test:

Injury Criteria	Front SID	Rear SID
TTI (g)	66	54
Pelvis (g)	79	89

TEST NOTES

1. The following accelerometers were not used for this test:

- Left Front Door on Centerline
- Midrear of Left Front Door
- Left Front Door Upper Centerline
- Midrear of Left Rear Door
- Left Rear Door Upper Centerline
- Rear Seat Track

SECTION 3
SIDE IMPACT DUMMY (SID) AND
VEHICLE TEST DATA

DATA SHEET NO. 1

GENERAL VEHICLE TEST PARAMETER DATATEST VEHICLE INFORMATION:Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 VIN: 4T1BF28B9YU020580Vehicle Body Color: Green Build Date: 11-99Engine Data: 6 Cylinders; CID; 3.0 Liter; ccPlacement Longitudinal; X LateralTransmission: 4 speed; Manual; X Automatic; X OverdriveFinal Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel DriveOdometer Reading 54 milesOptions: X A/C; X Pwr. Steering; X Pwr. Brakes; X Pwr. Windows; X Cruise Control; X Tilt Wheel; X Power Door Locks;DATA FROM TIRE PLACARD:Tire Pressure (at capacity): 31 Psi FRONT31 Psi REARRecommended Tire Size: P205/65/R15Tires on Test Vehicle; P205/65/R15 Manufacturer: Dunlop

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; 3rd Seat 5 TotalType of Front Seats: X Bucket; Bench; Split BenchType of Front Seat Back: Fixed; X Adjustable with Lever Knob X PowerVehicle Maximum Capacity Loading = 409.1 kg (A)No. of Occupants x 68.04 kg. = 340.2 kg (B)Cargo Capacity (A-B) = 68.9 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front =	<u>474.5</u>	kg	Right Rear =	<u>297.1</u>	kg
Left Front =	<u>470.4</u>	kg	Left Rear =	<u>313.4</u>	kg
TOTAL FRONT =	<u>944.9</u>	kg	TOTAL REAR =	<u>610.5</u>	kg
% of Total Weight =	<u>60.8</u>	%	% of Total Weight =	<u>39.3</u>	%
TOTAL WEIGHT =	<u>1555.4</u>	kg			

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1555.4</u>	kg
Cargo Carrying Capacity of Test Vehicle*	=	<u>68.9</u>	kg
Weight of 2 Side Impact Dummies (2 x <u>80.7</u> kg.)	=	<u>161.4</u>	kg
TEST VEHICLE TARGET WEIGHT	=	<u>1785.7</u>	kg

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO: (FULLY LOADED)

Right Front =	<u>480.3</u>	kg	Right Rear =	<u>367.4</u>	kg
Left Front =	<u>518.5</u>	kg	Left Rear =	<u>419.5</u>	kg
TOTAL FRONT =	<u>998.8</u>	kg	TOTAL REAR =	<u>786.9</u>	kg
% of Total Weight =	<u>55.9</u>	%	% of Total Weight =	<u>44.1</u>	%
TOTAL WEIGHT =	<u>1785.7</u>	kg			

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 683 mm Left Front 691 mm Right Rear 710 mm Left Rear 697 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 674 mm Left Front 673 mm Right Rear 671 mm Left Rear 651 mm

TEST ATTITUDE:

Right Front 673 mm Left Front 678 mm Right Rear 678 mm Left Rear 662 mm

* light trucks and MPVs RCW is 136.1 kgs or manufacturer's value, whichever is less

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2713 mm

C.G. As Tested = 1151 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4040 mm

Centerline = 4808 mm

Left Side = 4040 mm

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 225 mm

Test Position: 113 mm rearward of full forward (power seat)

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 9.4° measured on the headrest post

REAR POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: NA

Seat Back Adjustment Position: NA

ADJUSTABLE STEERING COLUMN POSITION: 3rd position of 5

WINDOW POSITIONS: Left Front Closed Left Rear Closed
Right Front Open Right Rear Open

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 70.0 liters

Test Volume: 64.6 liters 92.2 % of capacity

LOCATIONS OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase: = 2713 mm

Impact Point is 417 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL Sedan

Vehicle NHTSA No.: CY5102 Test Date: January 19, 2000

Overall Length = 4808 mm; Overall Width = 1821 mm

TEST WEIGHT:

Right Front =	<u>494.0</u> kg	Right Rear =	<u>363.8</u> kg
Left Front =	<u>529.4</u> kg	Left Rear =	<u>390.5</u> kg
TOTAL FRONT =	<u>1023.4</u> kg	TOTAL REAR =	<u>754.3</u> kg
% of Total Weight =	<u>57.6</u> %	% of Total Weight =	<u>42.4</u> %
TOTAL WEIGHT =	<u>1777.7</u> kg		
Wheelbase =	<u>2713</u> mm		

Longitudinal C.G. from Center of Front Axle = 1151 mm

Impact Angle with Respect to Impactor = 0° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (239 mm above ground) = 129 mm
2. LEVEL 2 (533 mm above ground) = 381 mm
3. LEVEL 3 (591 mm above ground) = 357 mm
4. LEVEL 4 (921 mm above ground) = 330 mm
5. LEVEL 5 (1374 mm above ground) = 109 mm

Maximum Post-Test Intrusion = 381 mm

OCCUPANTS:

	<u>Driver</u>	<u>Left Rear Passenger</u>
Type of Dummy	<u>SID</u>	<u>SID</u>
Restraints Used	<u>type II belt with</u> <u>frontal and side airbags</u>	<u>type II belt</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)INSTRUMENTATION:

Number of Vehicle Data Channels: = 20

Number of Cameras: Onboard Vehicle = 3

Offboard Vehicle = 4

Deformable Barrier = 2

TOTAL = 9

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTSYear/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000POSITION OF IMPACT (MDB) ON MONORAIL:Crabbed 27° to leftMDB DETAILS:

Overall Width of Framework Carriage	= <u>1252</u> mm
Overall Length of MDB (incl. honeycomb impact face)	= <u>4115</u> mm
Wheelbase of Framework Carriage	= <u>2591</u> mm
Tread of Framework Carriage (Front & Rear)	= <u>1880</u> mm
C.G. Location Rearward of Front Axle	= <u>1100</u> mm
C.G. Location From Center Line	= <u>-10</u> mm
C.G. Location Above Ground Level	= <u>477</u> mm

MDB WEIGHT:

Left Front	= <u>458.8</u> kg	Left Rear	= <u>230.3</u> kg
Right Front	= <u>324.4</u> kg	Right Rear	= <u>350.6</u> kg
TOTAL FRONT	= <u>783.2</u> kg	TOTAL REAR	= <u>580.9</u> kg
TOTAL MDB WEIGHT = <u>1364.1</u> kg			

Impact Angle (MDB C/L to Target Vehicle C/L) = 90° degreesImpact Speed = Primary: 38.5 mph (62.0 kph) Secondary: 38.5 mph (62.0 kph)

CRASH TEST SUMMARY FOR SIDE IMPACTOR (Cont'd)MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A Top of Stack (813 mm) = 162 mm
2. Row B Mid Stack (686 mm) = 103 mm
3. Row C Top of Bumper (533 mm) = 74 mm
4. Row D Center of Bumper (432 mm) = 177 mm

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL Sedan

Vehicle NHTSA No.: CY5102 Test Date: January 19, 2000

VISIBLE DUMMY CONTACT POINTS:

	<u>DRIVER</u>	<u>LEFT REAR SID</u>
Head	<u>to shoulder</u>	<u>to C-Post</u>
Arm	<u>to airbag</u>	<u>to door panel</u>
Pelvis	<u>to armrest</u>	<u>to armrest</u>
Left Knee	<u>to door panel</u>	<u>to door panel</u>
Right Knee	<u>to left knee</u>	<u>to left knee</u>

DOOR OPENING:

	<u>LEFT SIDE</u>	<u>RIGHT SIDE</u>
Front	<u>Remained closed</u>	<u>Remained closed</u>
Rear	<u>Remained closed</u>	<u>Remained closed</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 23 mm forward

Vertical: 13 mm high

ARM REST LOCATIONS:

Front: 230 mm from bottom of window

Rear: 249 mm from bottom of window

POST-TEST OBSERVATIONS (Cont'd)SEAT CRUSH:Front Seat Back: 141 mm Front Seat Cushion: 98 mmLeft Rear Seat Back: 73 mm Rear Seat Cushion: 118 mmGLAZING DAMAGE:Both left side windows broke , the windshield crackedPILLAR PERFORMANCE:No separationSILL SEPARATION:NoneFRONTAL AIRBAGS:Driver Deployed: No Passenger Deployed: NoSIDE AIRBAGS:Driver: Deployed properly Rear Passenger: NAOTHER NOTABLE IMPACT EFFECTS:None noted

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

SIDE IMPACT DUMMY (SID) INSTRUMENTATION DATA

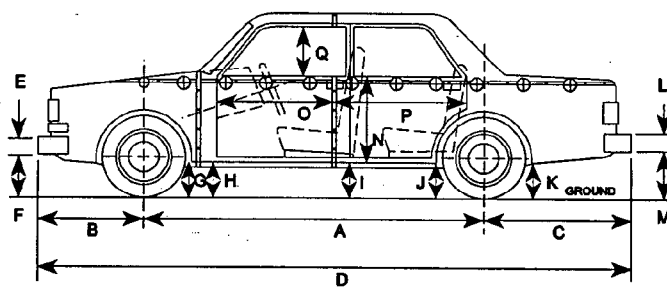
Year/Make/Model/Body Style: 2000ToyotaAvalon\4-DoorXL Sedan

Vehicle NHTSA No.: CY5102 Test Date: January 19, 2000

		Driver SID ID #036				Left Passenger SID ID #037			
		Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
		Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
HEAD ACCELERATIONS									
Longitudinal		8.9	172	-22.8	78	6.4	48	-26.9	60
Lateral		23.1	45	-10.0	166	103.2	58	-13.1	76
Vertical		41.9	51	-7	13	21.0	49	-60.1	65
Resultant		45.3	51			105.5	58		
HIC		219				839			
RIB ACCELERATIONS									
Left Upper Rib Y		56.0	34	-18.2	72	47.4	45	-9.5	128
Left Upper Rib Redundant Y (R)		54.0	34	-19.5	72	46.5	45	-9.5	128
Left Lower Rib Y		49.6	36	-18.5	86	53.5	44	-7.6	74
Left Lower Rib Redundant Y (R)		48.2	36	-17.3	86	53.9	44	-7.1	74
SPINE ACCELERATIONS									
Lower Lateral Y		75.4	37	-16.0	66	55.3	46	-11.6	69
Lower Lateral Redundant Y (R)		75.3	37	-16.8	66	54.4	46	-11.9	69
PELVIS ACCELERATIONS									
Lateral Y		79.0	32	-18.3	71	89.4	41	-6.7	75
Lateral Redundant Y (R)		80.6	32	-18.8	71	90.3	41	-6.9	74
REFERENCE: Positive Direction- Longitudinal (X) = forward Lateral (Y) = to right Vertical (Z) = down									

REFERENCE: Positive Direction- Longitudinal (X) = forward Lateral (Y) = to right Vertical (Z) = down

DATA SHEET NO. 6
VEHICLE PRE AND POST-TEST MEASUREMENTS



LEFT SIDE VIEW

D = Length at Centerline

R = Right Side Length

S = Left Side Length

T = Width at B Post

J1 = To Pinch Weld

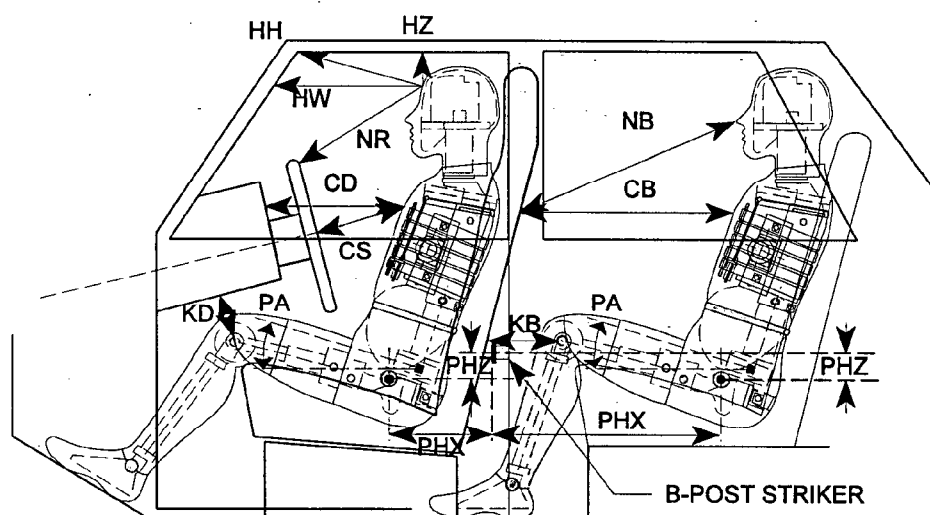
E & L = Bumper Thickness

J2 = To Sill

ALL MEASUREMENTS IN (mm)

	PRE-TEST	POST-TEST	Δ CHANGE
A	2713	2688	25
B	925	906	19
C	1170	1174	-4
D	4808	4768	40
E	126	126	0
F	392	408	-16
G	172	178	-6
H	195	207	-12
I	194	264	-70
J1/J2	161/182	150/192	11/-10
K	204	209	-5
L	246	246	0
M	354	374	-20
N	715	608	107
O	816	774	42
P	1199	1064	135
Q	442	411	31
R	4040	4045	-5
S	4040	3997	43
T	1821	1476	345

DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanNHTSA NO.: CY5102 Test Date: January 19, 2000NOTE: All dimensions are in mm with tolerance of ± 3 mm

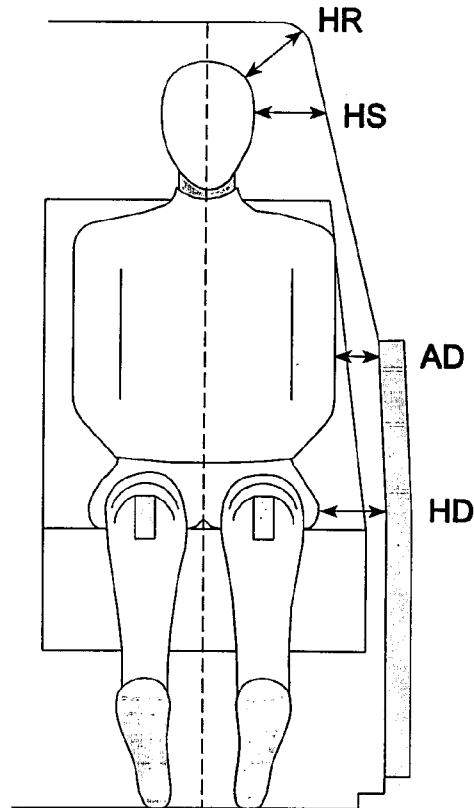
	DRIVER ID #036		REAR PASSENGER SID ID #037
HH	420	HZ	146
HW	638	NB	693
HZ	174	CB	613
NR	496	KBL (KBA)	310 (0.0°)
CD	714	KBR (KBA)	314 (0.0°)
CS	372	PA°	23.7°
KDL (KDA°)	162 (20.1°)	PHX	175
KDR (KDA°)	205 (0.0°)	PHZ	302
PA°	24.8°		
PHX	194		
PHZ	205		

NOTE: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as reference point.

DATA SHEET NO. 8
SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL Sedan

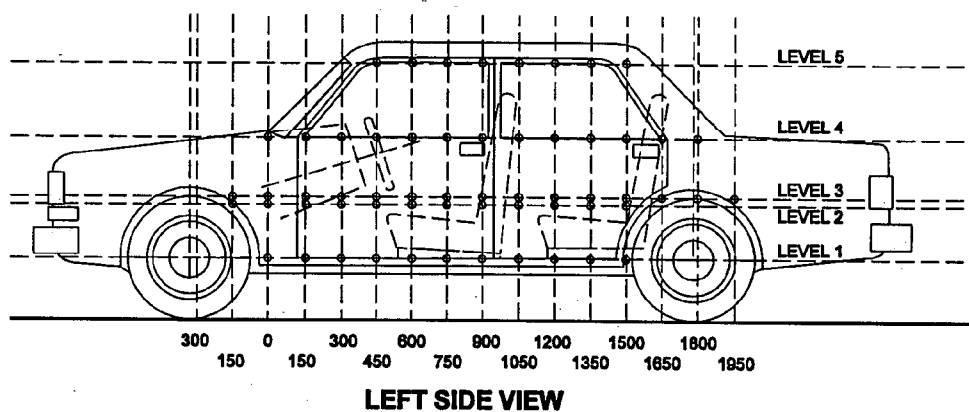
NHTSA NO.: CY5102 Test Date: January 19, 2000



NOTE: All dimensions are in mm

	DRIVER ID #036	REAR PASSENGER ID #037
HR	224	211
HS	335	260
AD	127	86
HD	202	172

DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTSYear/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanNHTSA NO.: CY5102 Test Date: January 19, 2000

NOTE: All measurements are in millimeters (mm)

LEVEL 5 - WINDOW TOP
 LEVEL 4 - WINDOW SILL
 LEVEL 3 - MID-DOOR
 LEVEL 2 - OCCUPANT H-POINT
 LEVEL 1 - SILL TOP HEIGHT

MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED"
 CONFIGURATION

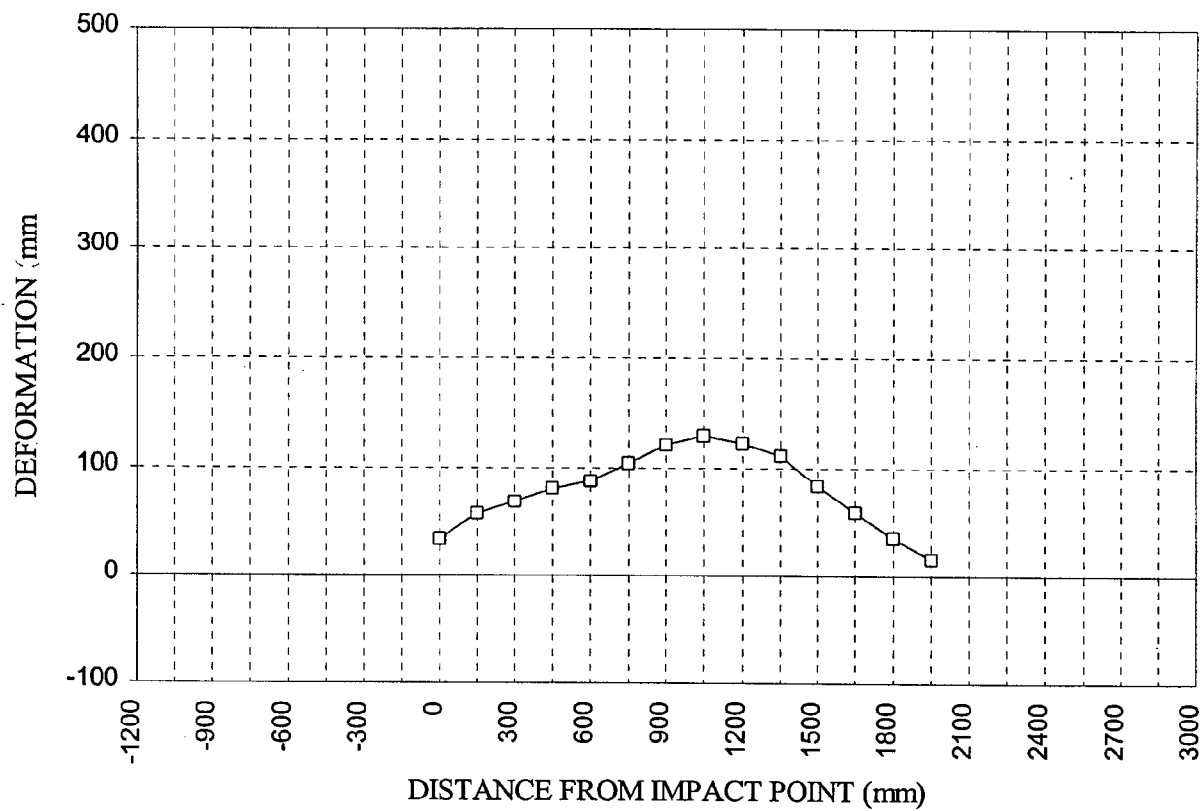
MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

Level 1 @ Sill Top Height	= <u>239</u> mm
Level 2 @ Occupant H-Point	= <u>533</u> mm
Level 3 @ Mid Door	= <u>591</u> mm
Level 4 @ Window Sill	= <u>921</u> mm
Level 5 @ Window Top	= <u>1374</u> mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 1 - Sill Top Height		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	718	751	33
150	728	784	56
300	729	797	68
450	727	807	80
600	726	814	88
750	728	832	104
900	727	848	121
1050	726	855	129
1200	729	852	123
1350	726	837	111
1500	730	813	83
1650	731	789	58
1800	730	764	34
1950	720	734	14
2100			
2250			
2400			
2550			
2700			
2850			
3000			

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

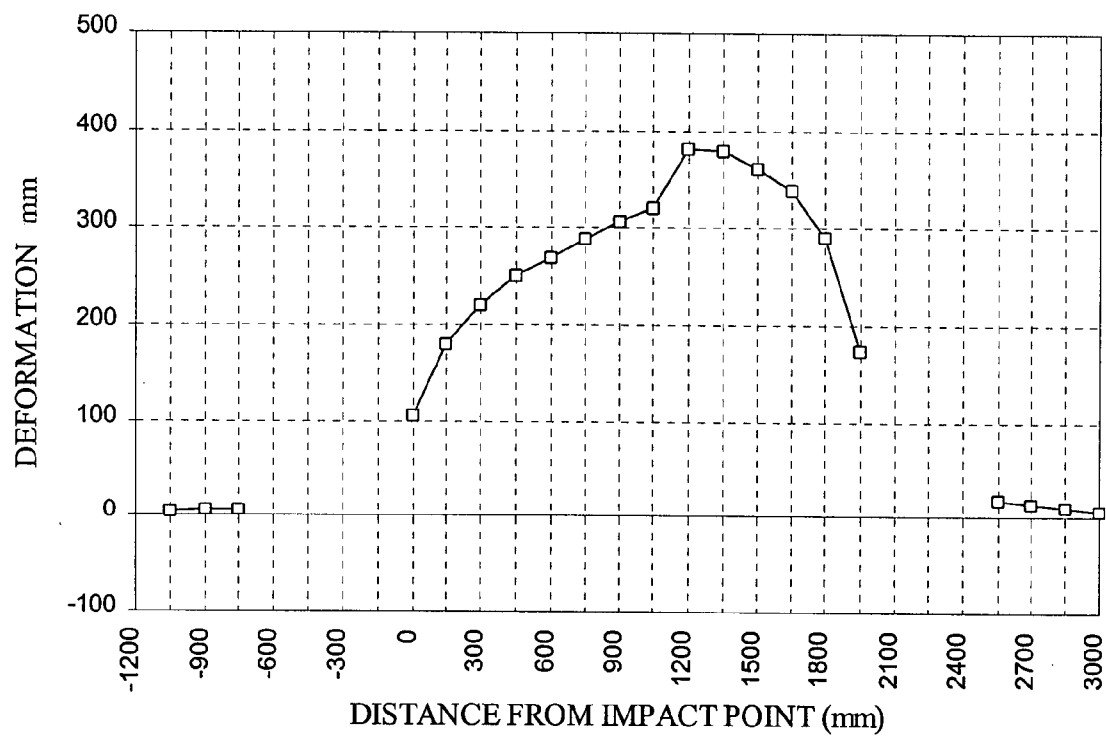
VEHICLE EXTERIOR STATIC CRUSH (Cont'd)

LEVEL 1 - SILL TOP HEIGHT

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 2 - Occupant H Point		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050	734	738	4
-900	703	709	6
-750	682	689	7
-600			
-450			
-300			
-150			
0 (impact point)	672	777	105
150	669	848	179
300	668	889	221
450	667	917	250
600	665	933	268
750	663	952	289
900	663	969	306
1050	663	984	321
1200	663	1044	381
1350	664	1044	380
1500	665	1027	362
1650	666	1005	339
1800	667	957	290
1950	667	840	173
2100			
2250			
2400			
2550	672	691	19
2700	692	707	15
2850	706	717	11
3000	720	727	7

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

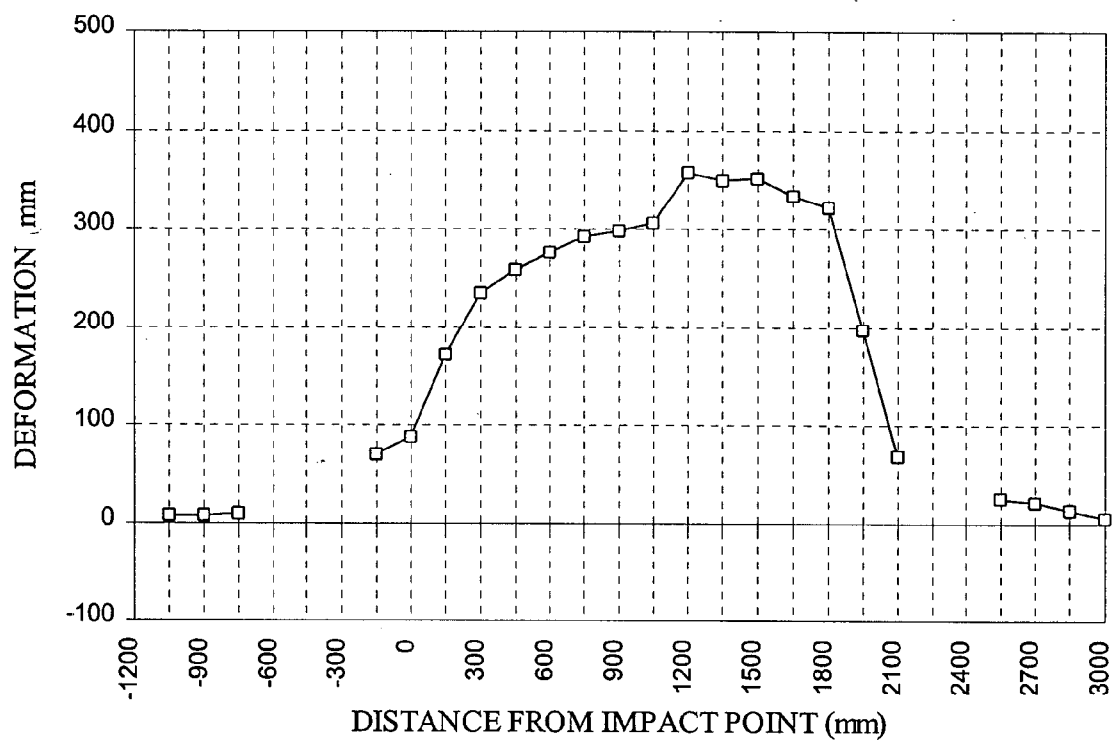
VEHICLE EXTERIOR STATIC CRUSH (Cont'd)

LEVEL 2 - OCCUPANT H-POINT

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 3 - Mid Door		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050	733	740	7
-900	703	709	6
-750	682	691	9
-600			
-450			
-300			
-150	662	732	70
0 (impact point)	666	755	89
150	663	834	171
300	662	896	234
450	660	918	258
600	658	934	276
750	657	950	293
900	657	956	299
1050	657	962	305
1200	657	1014	357
1350	657	1006	349
1500	659	1010	351
1650	659	992	333
1800	660	981	321
1950	662	860	198
2100	662	730	68
2250			
2400			
2550	677	702	25
2700	692	712	20
2850	706	718	12
3000	722	727	5

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

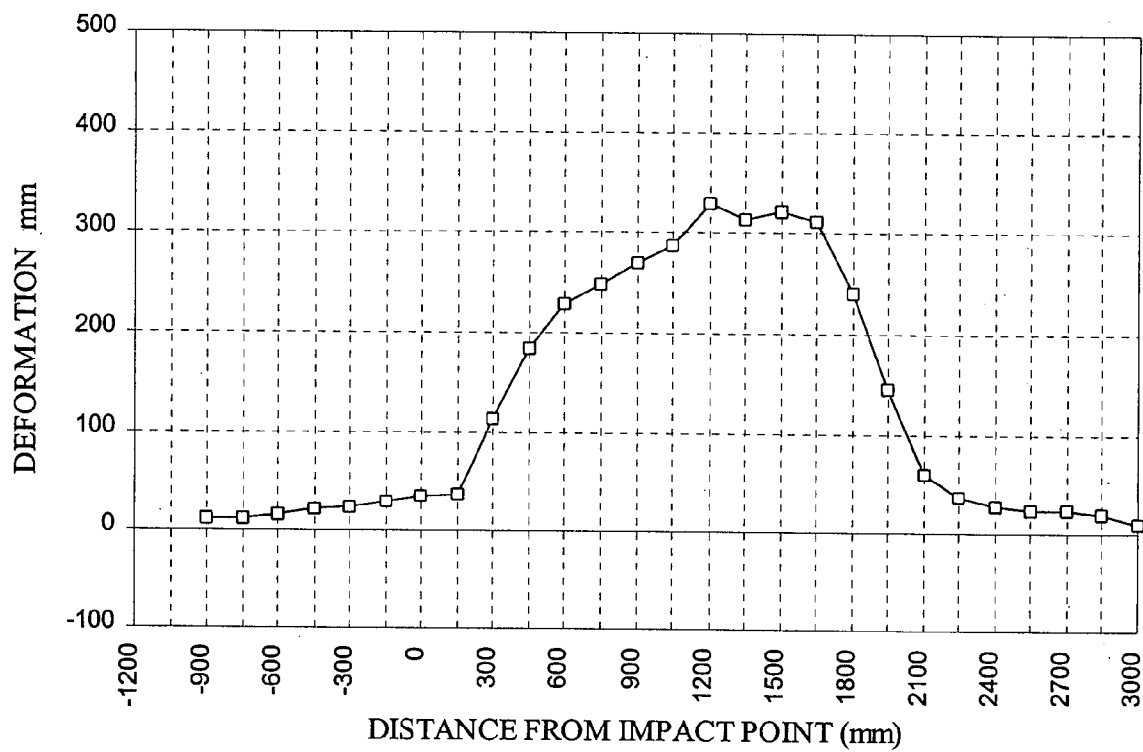
VEHICLE EXTERIOR STATIC CRUSH (Cont'd)

LEVEL 3 - MID DOOR

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900	828	840	12
-750	807	818	11
-600	786	802	16
-450	772	794	22
-300	762	785	23
-150	754	783	29
0 (impact point)	750	785	35
150	744	780	36
300	740	853	113
450	730	914	184
600	725	954	229
750	723	970	247
900	720	989	269
1050	720	1006	286
1200	718	1048	330
1350	719	1034	315
1500	716	1038	322
1650	720	1032	312
1800	718	959	241
1950	719	864	145
2100	723	783	60
2250	732	769	37
2400	738	765	27
2550	749	773	24
2700	759	782	23
2850	773	792	19
3000	786	795	9

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

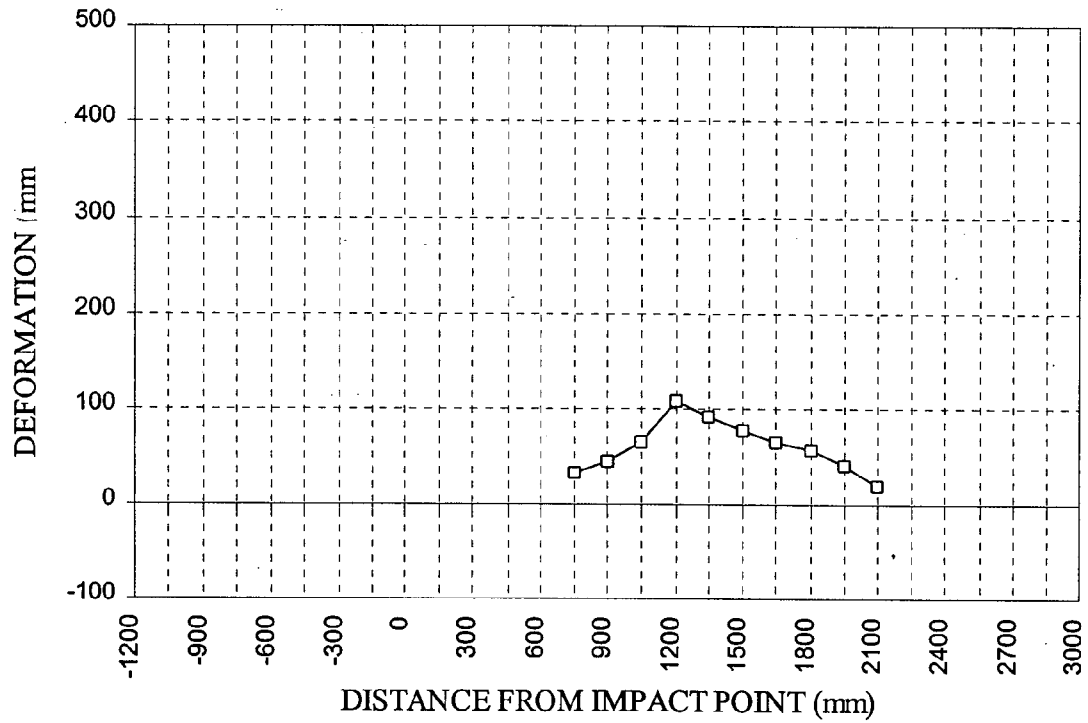
VEHICLE EXTERIOR STATIC CRUSH (Cont'd)

LEVEL 4 - WINDOW SILL

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 5 - Window Top		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600			
750	938	971	33
900	926	971	45
1050	920	987	67
1200	918	1027	109
1350	917	1009	92
1500	915	994	79
1650	913	980	67
1800	913	971	58
1950	916	957	41
2100	930	950	20
2250			
2400			
2550			
2700			
2850			
3000			

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)

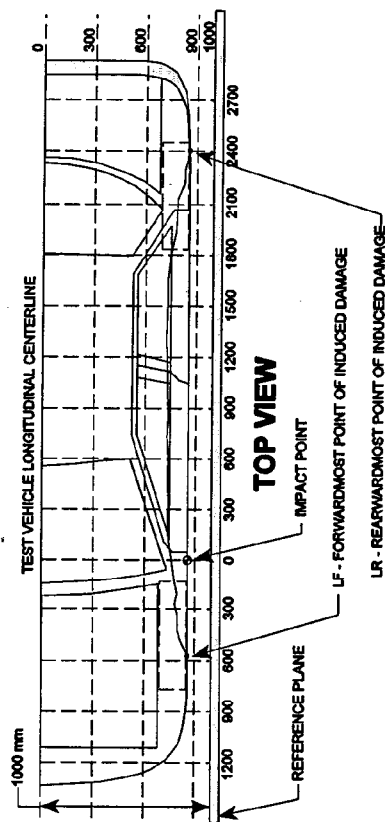
LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 2000 Toyota Avalon\4-Door\XL Sedan

NHTSA NO.: CY5102 Test Date: January 19, 2000



MEASUREMENT CONVENTIONS:

Forward of the impact point (towards front of vehicle) is considered negative (-).

Rearward of the impact point (toward rear/end of vehicle) is considered positive (+).

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LR = <u>3150</u> mm)	768	764	4
2. <u>2270</u> mm	765	732	33
3. <u>1442</u> mm	932	665	267
4. <u>559</u> mm	949	726	223
5. <u>-232</u> mm	782	758	24
6. (LF = <u>-1050</u> mm)	738	734	4

DATA SHEET NO. 12

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

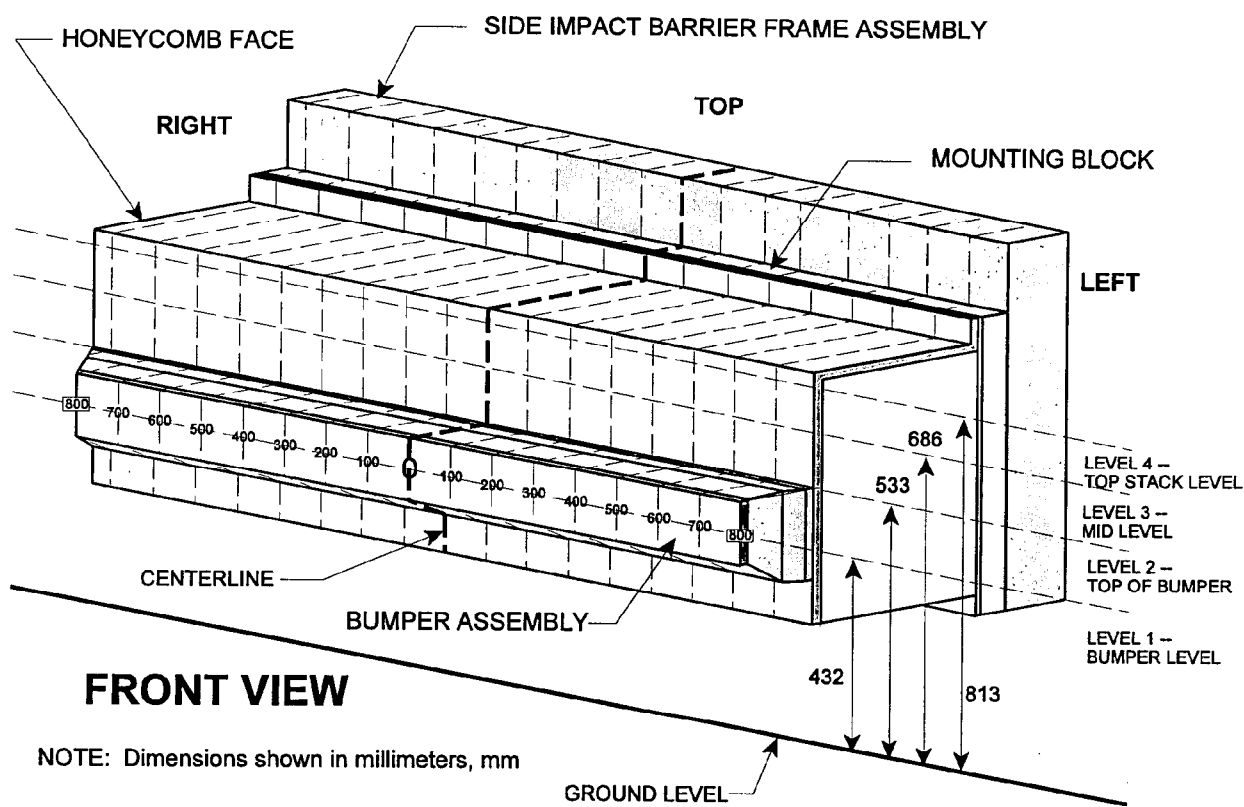
Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL Sedan

Vehicle NHTSA No.: CY5102 Test Date: January 19, 2000

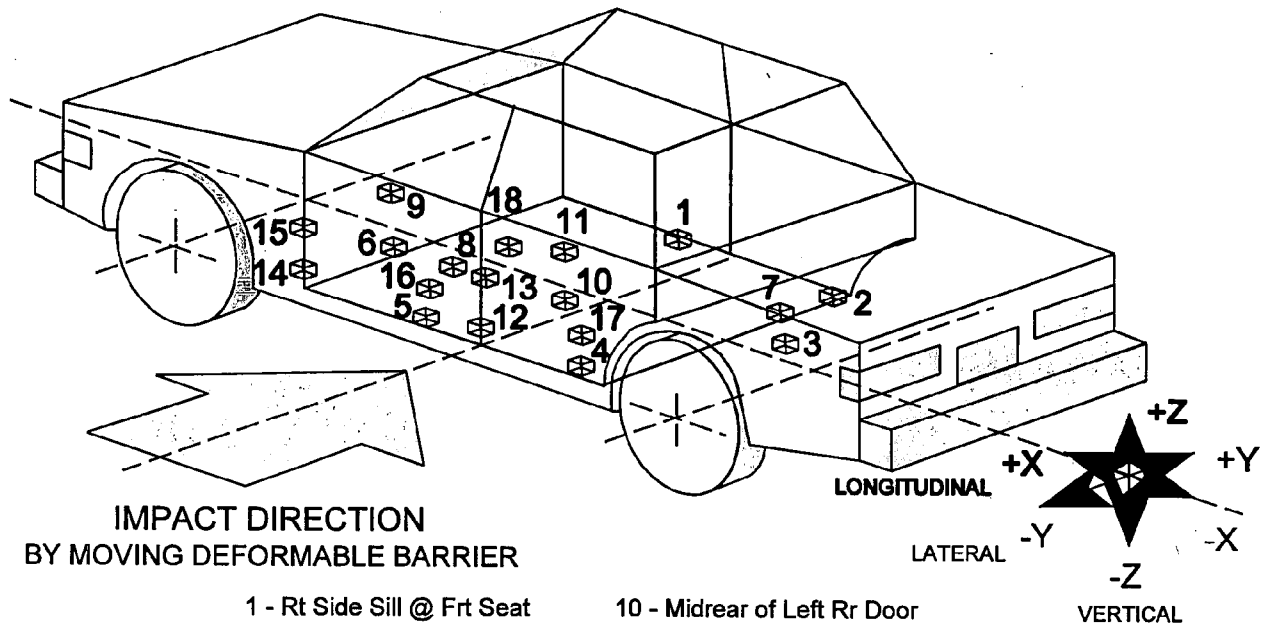
Location	Height at CL*	Distance Right of Center (mm)									Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	64	7	-7	-5	-2	3	12	7	7	6	9	16	25	38	72	113	162
Mid Level Level 3	686 mm	47	3	1	2	4	10	22	17	9	6	9	12	13	16	25	54	103
Top Bumper Level 2	533 mm	69	58	49	47	41	41	39	37	35	36	38	41	44	46	50	59	74
Mid Bumper Level 1	432 mm	177	161	144	133	131	125	125	125	117	116	118	120	126	128	136	154	164

* See next page for Barrier Face Graphic

DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000

IMPACT DIRECTION
BY MOVING DEFORMABLE BARRIER

- | | |
|---------------------------------|-------------------------------|
| 1 - Rt Side Sill @ Frt Seat | 10 - Midrear of Left Rr Door |
| 2 - Rt Side Sill @ Rr Seat | 11 - Left Rr Door Uptr C/Line |
| 3 - Rr Floorpan Above Axle | 12 - Left Lwr B-Post |
| 4 - Left Side Sill @ Rr Seat | 13 - Left Middle B-Post |
| 5 - Left Side Sill @ Frt Seat | 14 - Left Lwr A-Post |
| 6 - Left Frt Door on Centerline | 15 - Left Middle A-Post |
| 7 - Rt Rr Occ Compartment | 16 - Frt Seat Track |
| 8 - Midrear of Left Frt Door | 17 - Rr Seat Track |
| 9 - Left Frt Door Uptr C/Line | 18 - Vehicle C.G. |

DATA SHEET NO. 13 (Cont'd)

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL Sedan

Vehicle NHTSA No.: CY5102 Test Date: January 19, 2000

Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Right Side Sill @ Front Seat	2850	707	218	3.0	-4.3	20.5	-2.3	4.0	-6.7	21.0
2	Right Side Sill @ Rear Seat	1900	710	233	3.8	-4.1	21.4	-2.5	6.1	-8.6	22.9
3	Rear Floorpan Above Axle	1180	0	475	2.3	-4.3	19.1	-2.4	13.8	-9.5	20.2
4	Left Side Sill @ Rear Seat	1898	-710	232	---	---	33.5	-2.5	---	---	---
5	Left Side Sill @ Front Seat	2848	-707	218	---	---	33.1	-6.9	---	---	---
7	Right Rear Occupant Compartment	1930	342	362	---	---	22.0	-3.0	---	---	---
12	Left Lower B-Post	2234	-692	327			77.2	-8.6			
13	Left Middle B-Post	2252	-735	929			132.1	-38.3			
14	Left Lower A-Post***	3422	-722	335			14.6	-12.9			
15	Left Mid A-Post	3436	-838	868			**	**			
16	Driver Seat Track	2469	-573	295			65.0	-8.8			
18	Vehicle CG	2799	55	440	3.6	-8.4	22.9	-1.8	12.1	-6.0	23.3

*Reference: X - Rear Bumper (+ Forward) ** Accelerometer separated from vehicle

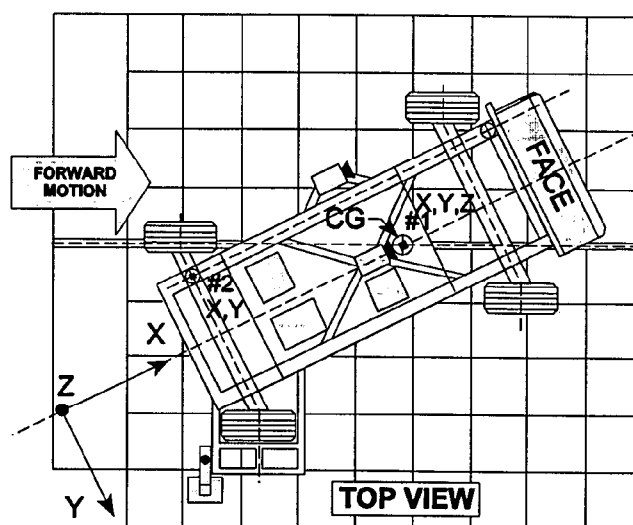
Y - Vehicle Centerline (+ To right) *** Data is questionable

Z - Ground Level (+ Up)

DATA SHEET NO. 14
MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA
SUMMARY

Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL Sedan

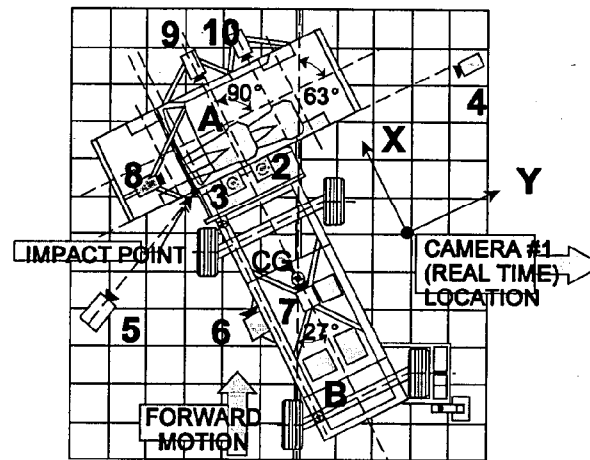
Vehicle NHTSA No.: CY5102 Test Date: January 19, 2000



Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.2	125	-18.6	35
	Lateral (Y)	---	---	---	1.1	178	-8.0	45
	Vertical (Z)	---	---	---	16.3	50	-16.3	44
	Resultant (R)	---	---	---	24.5	44		
2	Rear Frame Member	-2591	-625	622				
	Longitudinal (X)	---	---	---	2.0	107	-21.2	41
	Lateral (Y)	---	---	---	3.8	27	-1.5	199

*Reference: X - Front Axle (+ Forward)
Y - Vehicle Centerline (+ To right)
Z - Ground Level (+ Up)

DATA SHEET NO. 15

HIGH SPEED CAMERA LOCATIONS AND DATAYear/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000

Camera No.	View	Coordinates (mm)*			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Real Time				10	24
2	Top Overall	1656	1210	5000	13	1053
3	Top Impact	-200	35	5000	13	1070
4	Rear Impact	-4700	10100	1830	8	1081
5	Left Impact	-1000	-2330	1750	8	1031
6	Cart Impact				25	1005
7	Cart Wide				8	1010
8	Hood				13	1005
9	Onboard Front Occupant				13	1015
10	Onboard Rear Occupant				13	1000

* Reference: (from impact point)

+X = Forward

+Y = To Right

+Z = Upward from floor level

DATA SHEET 16

FUEL SYSTEM INTEGRITY POST IMPACT TEST DATAVehicle Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000TEST REQUIREMENTS:

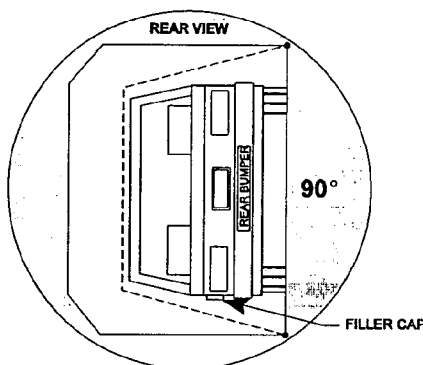
Drain the test vehicle's fuel system and operate the engine until the fuel system is dry. Add Stoddard solvent, which has been dyed purple, until 92-94% of the stated usable capacity is reached. Operate the engine to assure the Stoddard solvent is present throughout the entire fuel system.

TEST VEHICLE IMPACT TYPE: Left Side Impact MDB 38.5 mph (62.0 kph)FUEL SPILLAGE MEASUREMENT:

POST IMPACT TEST	TEST RESULTS	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases	0 oz	1 oz
2. For 5 minute period after vehicle motion ceases	0 oz	5 oz
3. For next 25 minutes	0 oz	1 oz./1 min

FUEL SPILLAGE LOCATION(S): None

DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATAVehicle Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000TEST PHASE: 0° - 90°DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 47 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 47 seconds

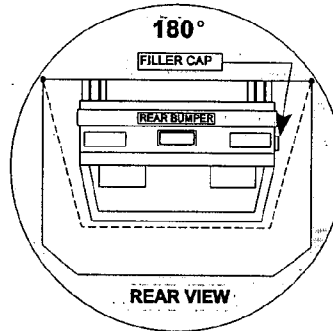
Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)Vehicle Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000TEST PHASE: 90° - 180°DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time = 2 minutes 32 seconds

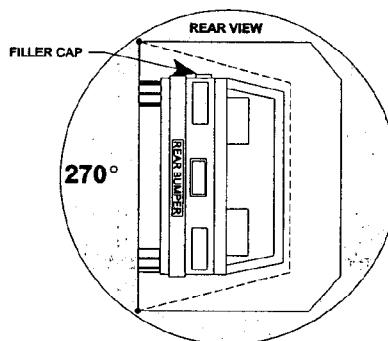
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 secondsTOTAL TIME = 7 minutes 32 secondsNext Whole Minute Interval = 8 minutesFUEL SPILLAGE MEASUREMENT:

90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)Vehicle Year/Make/Model/Body Style: 2000\Toyota\Avalon\4-Door\XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000TEST PHASE: 180° - 270°DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time = 2 minutes 7 seconds

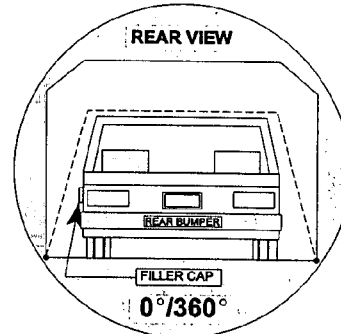
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 secondsTOTAL TIME = 7 minutes 7 secondsNext Whole Minute Interval = 8 minutesFUEL SPILLAGE MEASUREMENT:

180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATAVehicle Year/Make/Model/Body Style: 2000 Toyota Avalon 4-Door XL SedanVehicle NHTSA No.: CY5102 Test Date: January 19, 2000TEST PHASE: 270° - 360°DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time = 2 minutes 39 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 secondsTOTAL TIME = 7 minutes 39 secondsNext Whole Minute Interval = 8 minutesFUEL SPILLAGE MEASUREMENT:

270° TO 360° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

APPENDIX A - PHOTOGRAPHS

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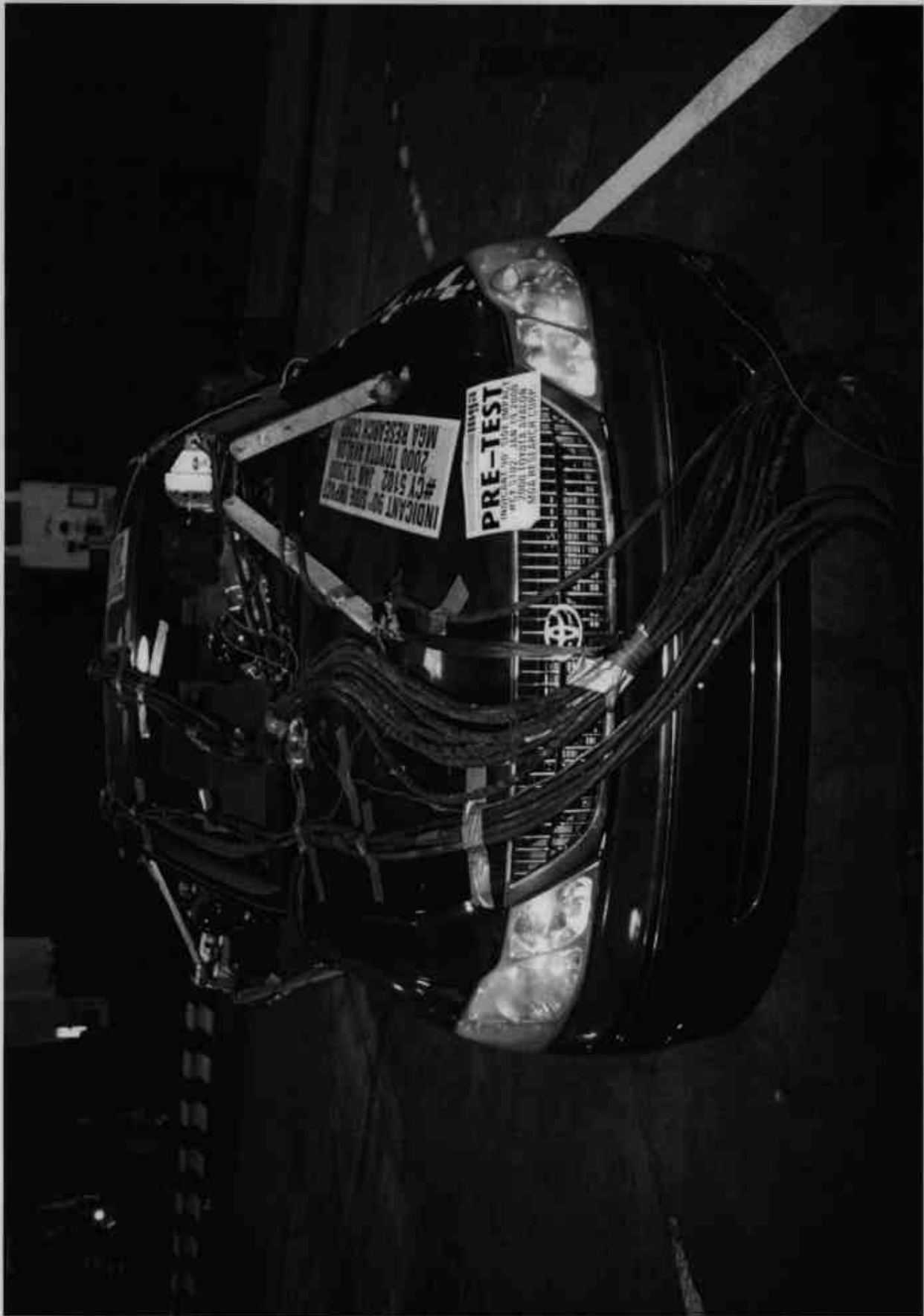


Photo No. A-1 - Pre-Test Front View of Test Vehicle



Photo No. A-2 - Post-Test Front View of Test Vehicle

A-2

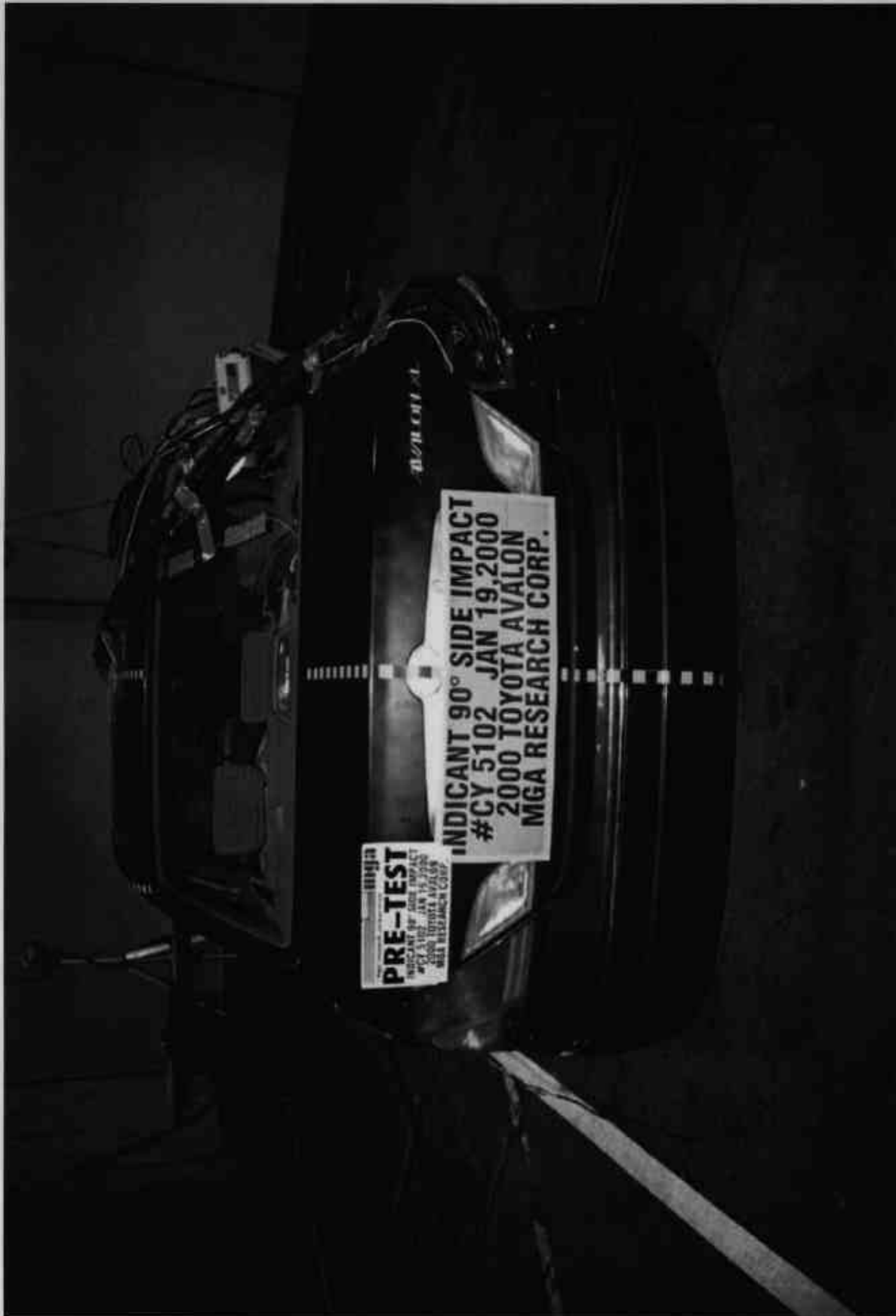


Photo No. A-3 - Pre-Test Rear View of Test Vehicle



Photo No. A-4 - Post-Test Rear View of Test Vehicle

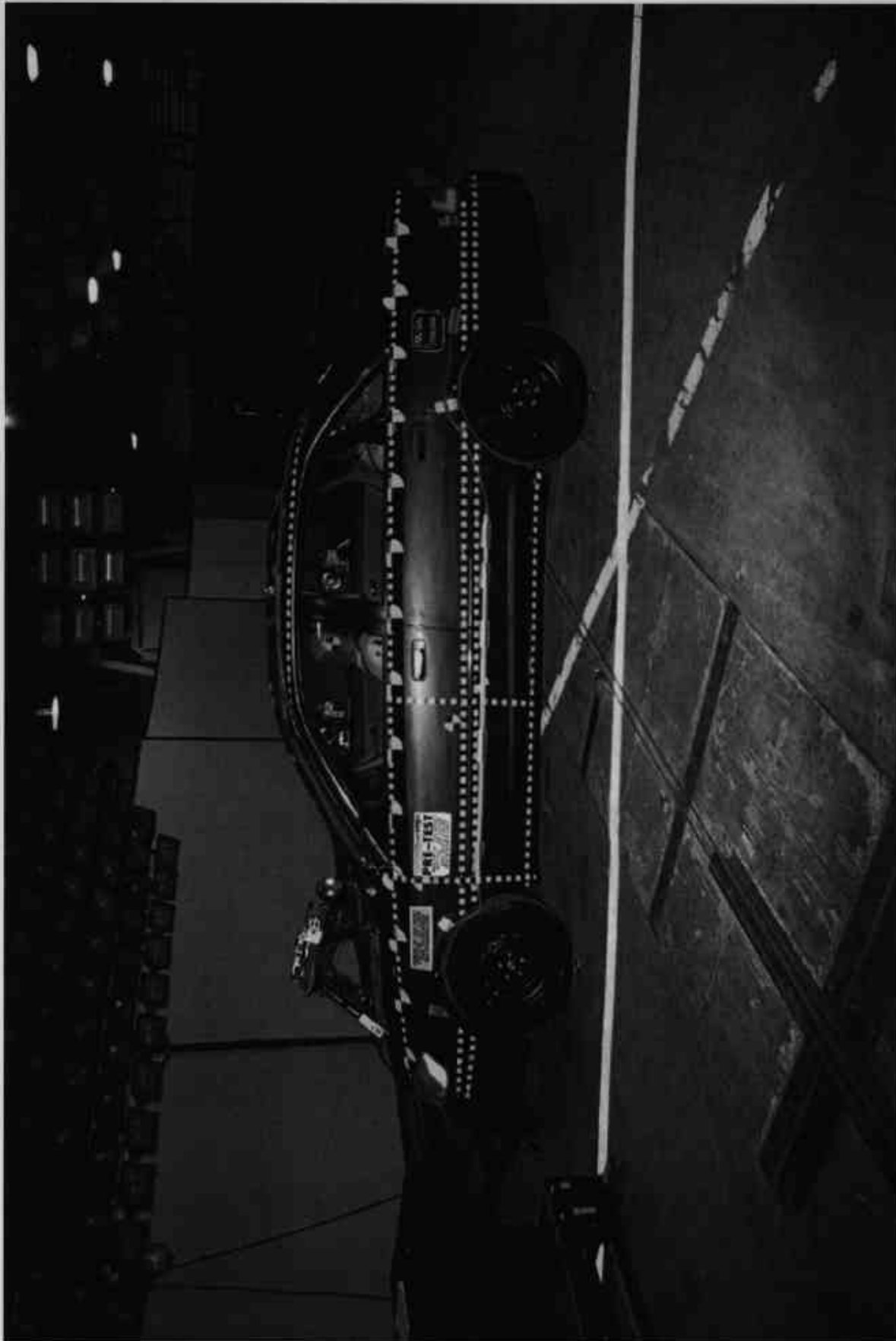


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

Photo No. A-6 - Post-Test Left Side View of Test Vehicle



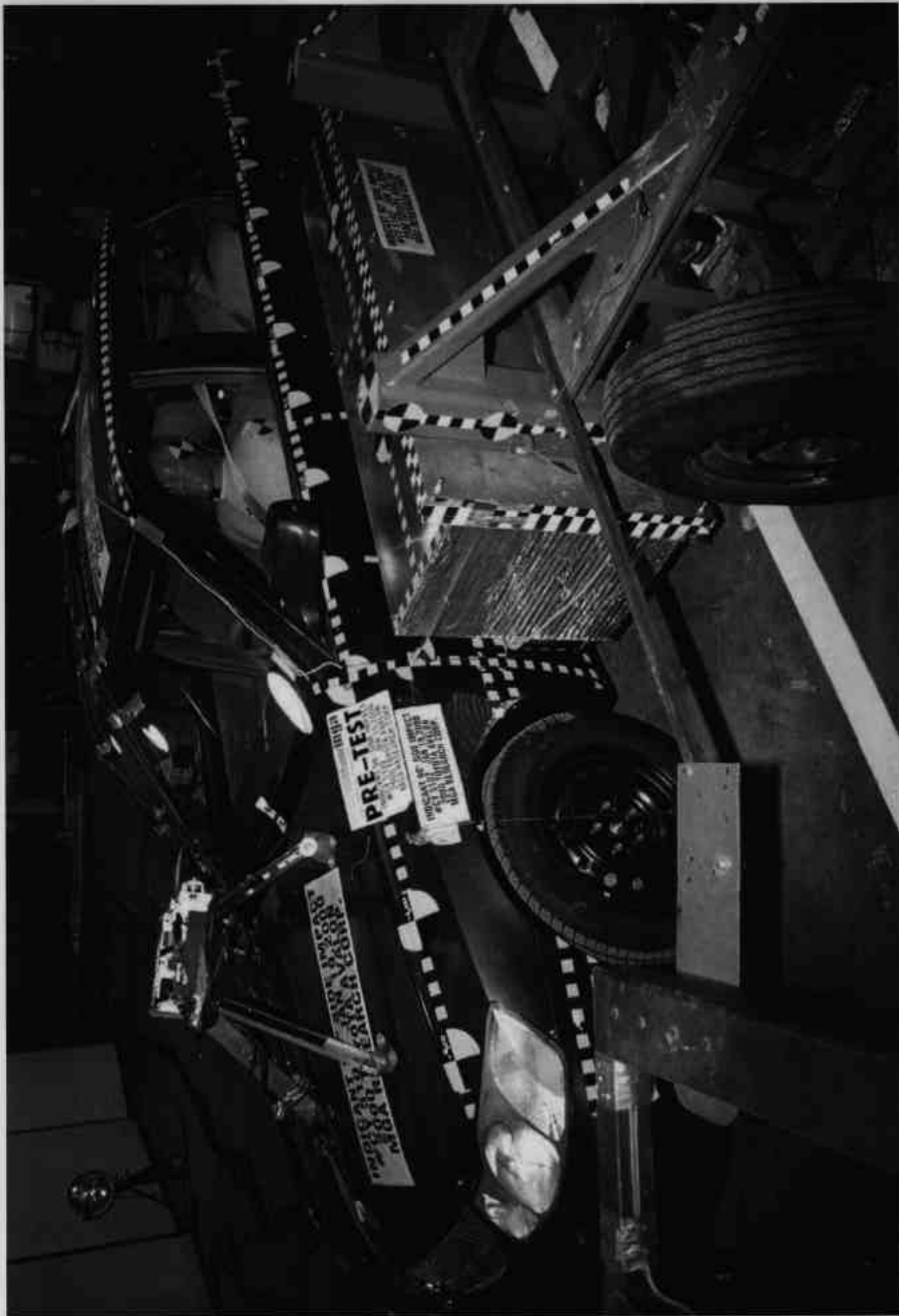


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)



Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)



A-9

Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View



Photo No. A-10 - Post-Test MDB and Vehicle (left side)



Photo No. A-11 - Post-Test MDB and Vehicle (right side)



A-12

Photo No. A-12 - Post-Test MDB and Vehicle Overhead View

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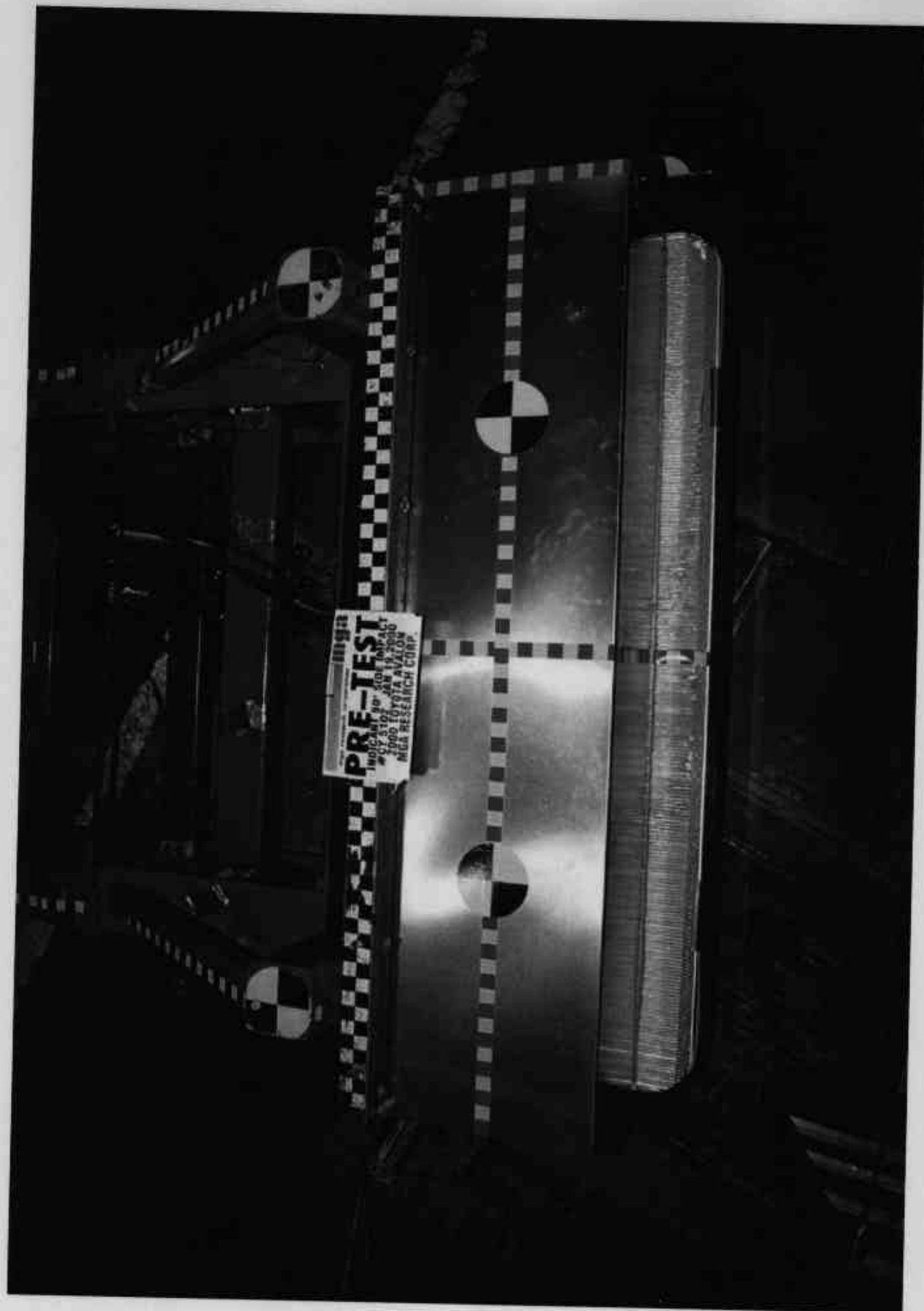
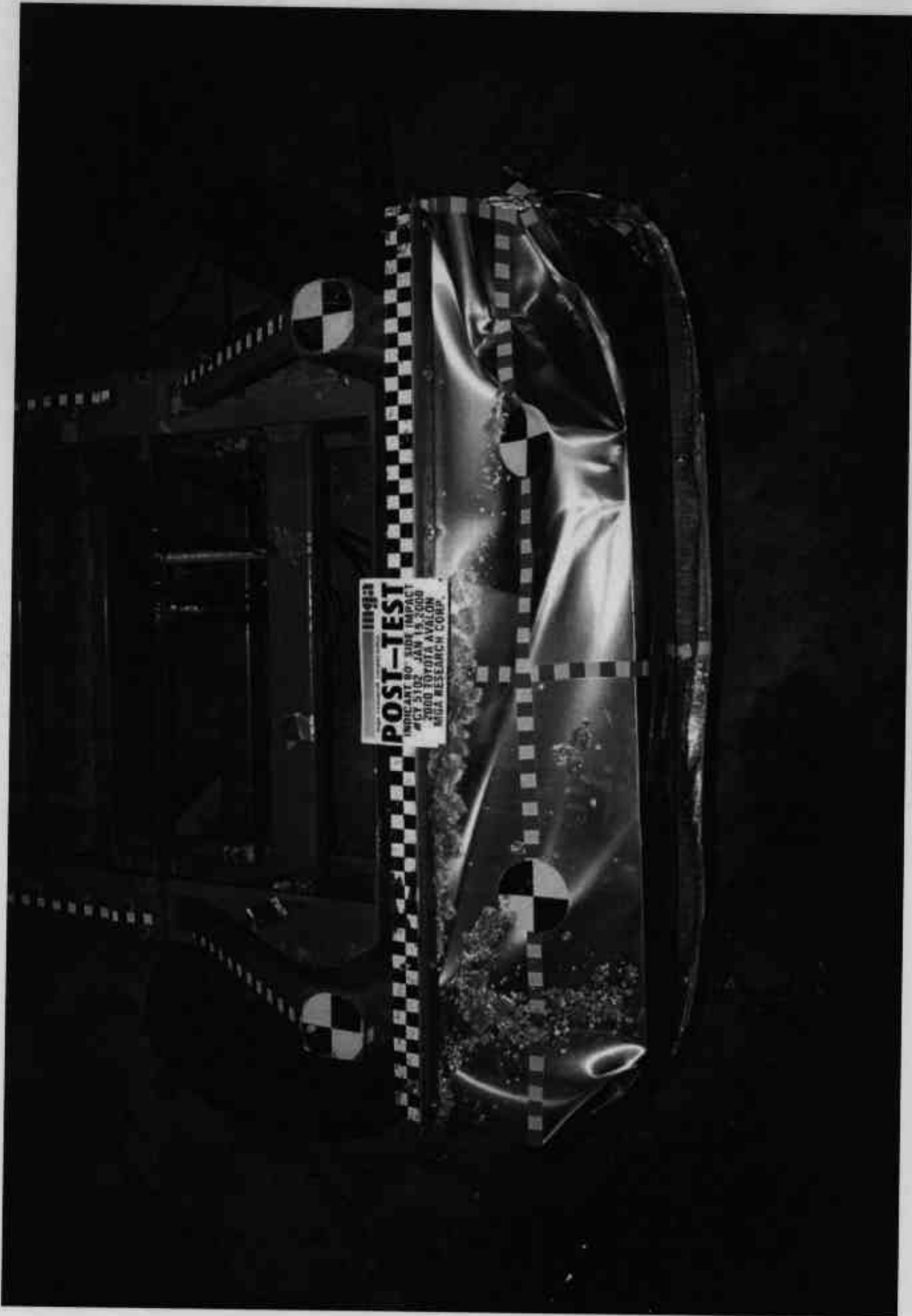


Photo No. A-13 - Pre-Test MDB Top View

Photo No. A-14 - Post-Test MDB Top View



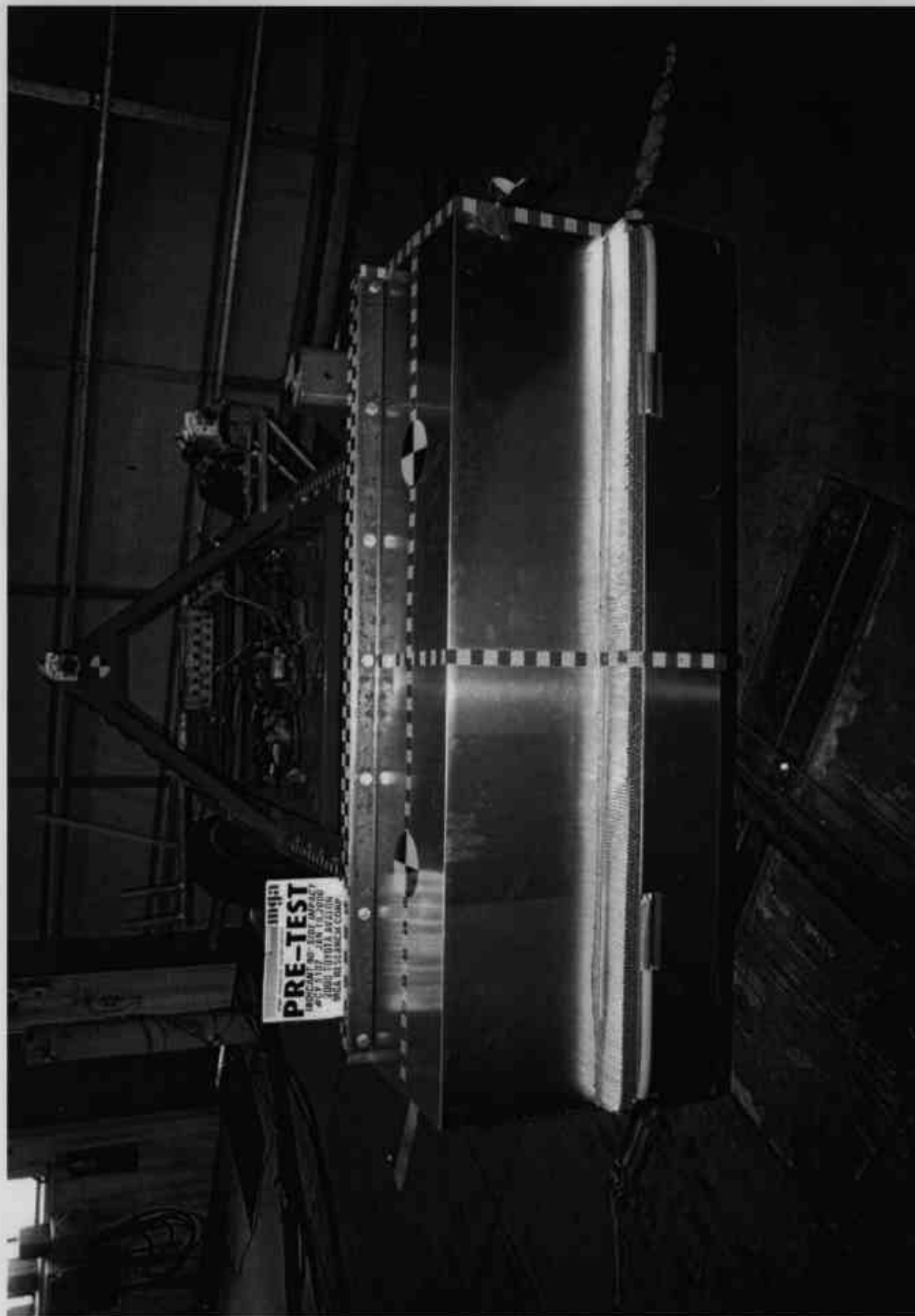
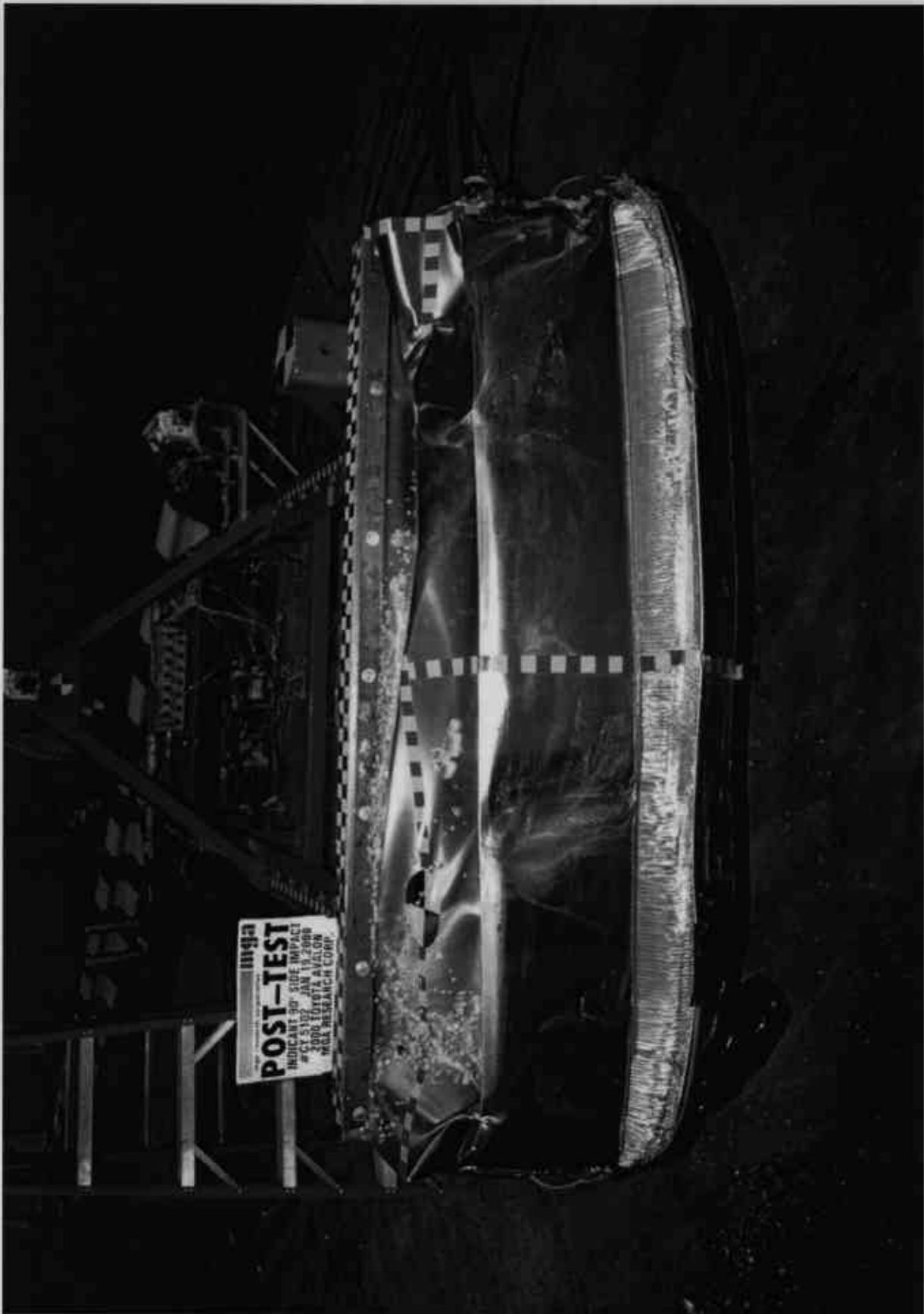


Photo No. A-15 - Pre-Test MDB Front View



A-16

Photo No. A-16 - Post-Test MDB Front View



Photo No. A-17 - Pre-Test MDB Left Side View



Photo No. A-18 - Post-Test MDB Left Side View



Photo No. A-19 - Pre-Test MDB Right Side View



A-20

Photo No. A-20 - Post-Test MDB Right Side View



A-21

Photo No. A-21 - Pre-Test Driver Dummy Right Side View



Photo No. A-22 - Post-Test Driver Dummy Right Side View

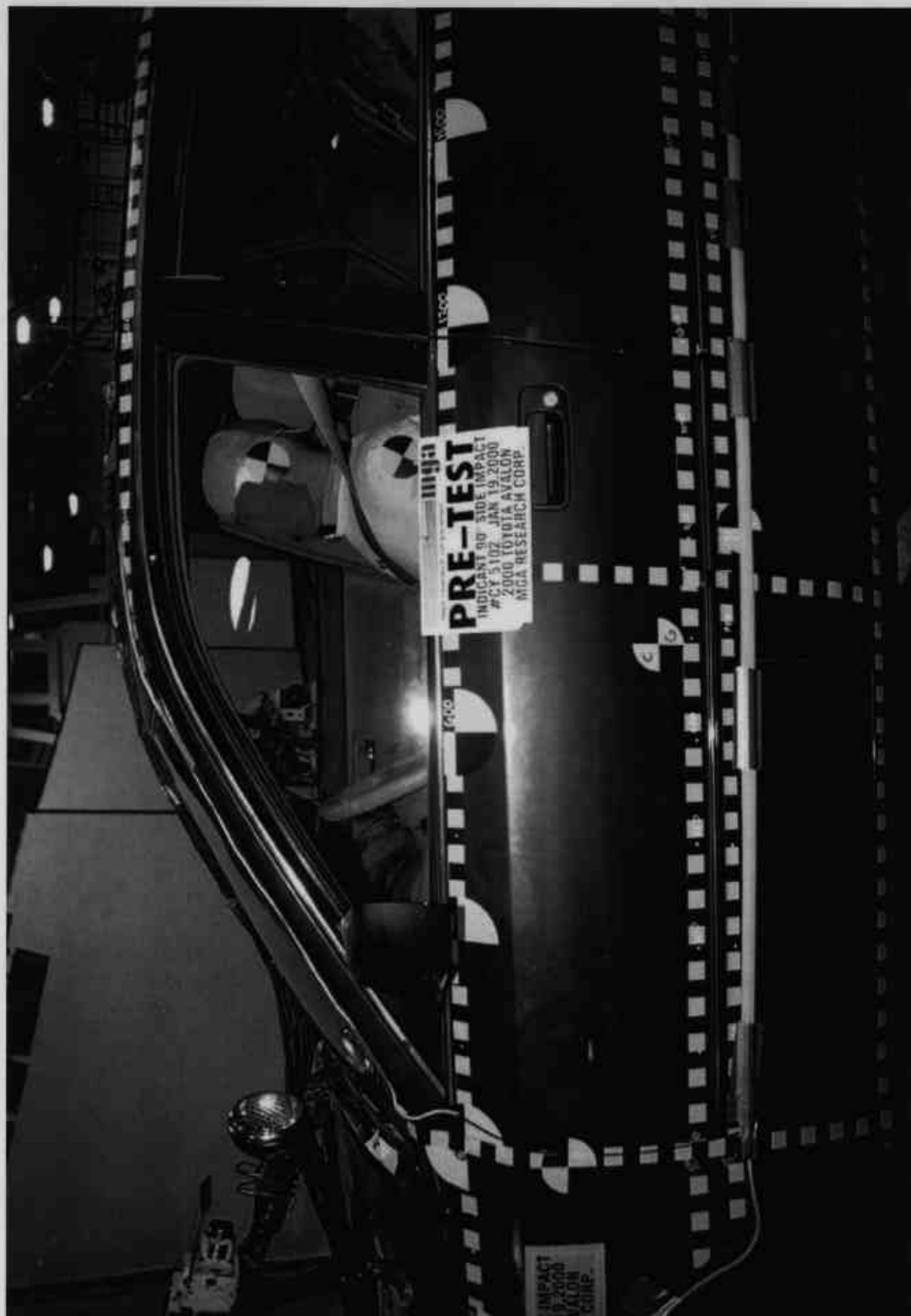


Photo No. A-23 - Pre-Test Driver Dummy Left Side View



Photo No. A-24 - Post-Test Driver Dummy Left Side View



Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)

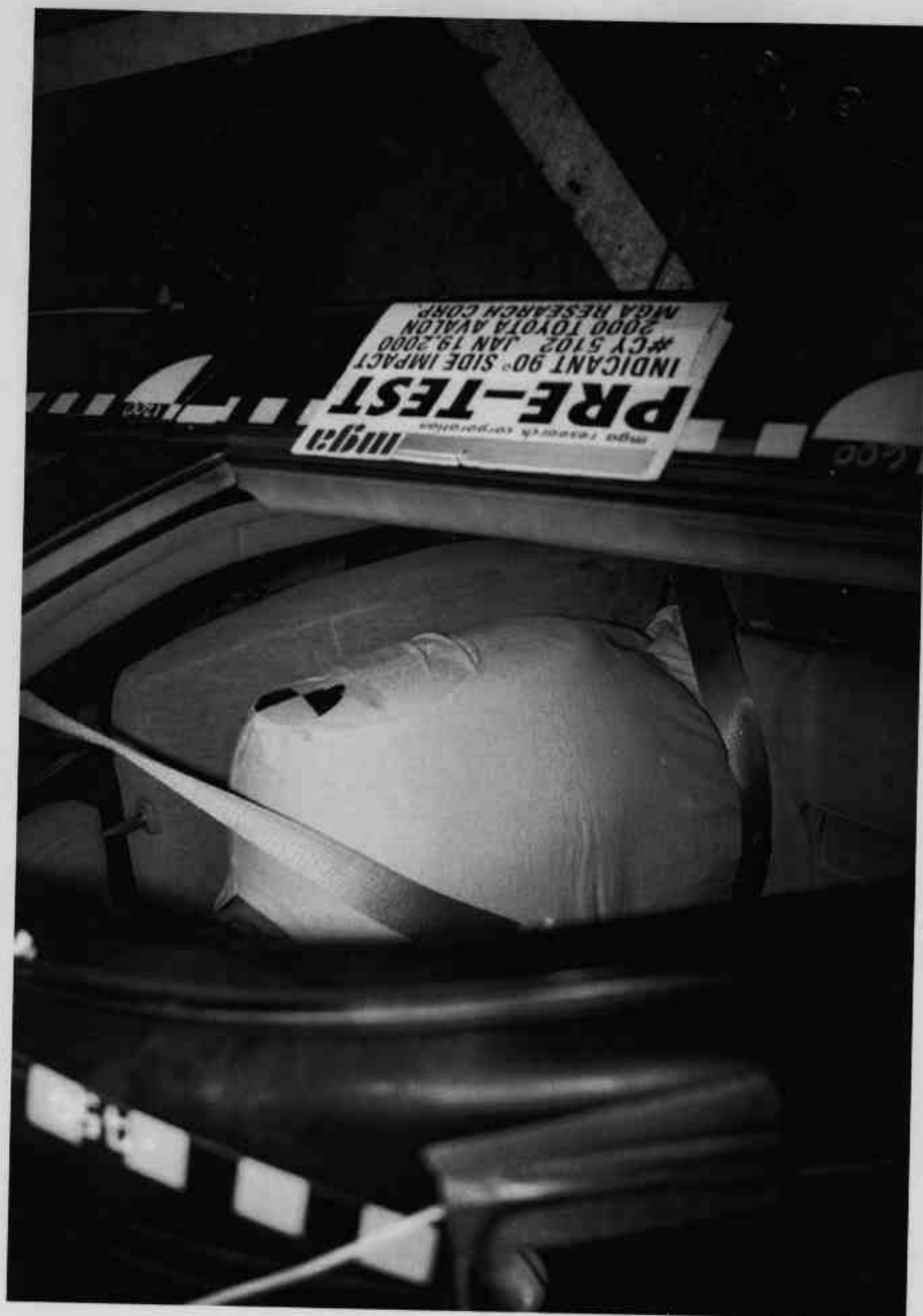


Photo No. A-26 - Pre-Test Driver Shoulder and Door Top View



Photo No. A-27 - Post-Test Driver Shoulder and Door Top View



Photo No. A-28 - Post-Test Driver Dummy Contact



Photo No. A-29 - Post-Test Driver Dummy Head Contact



Photo No. A-31 - Post-Test Rear Passenger Dummy Right Side View



A-32

Photo No. A-32 - Pre-Test Rear Passenger Dummy Left Side View



Photo No. A-33 - Post-Test Rear Passenger Dummy Left Side View



Photo No. A-34 - Post-Test Rear Passenger Dummy Left Side View (Door Open)



Photo No. A-35 - Pre-Test Rear Passenger Dummy Shoulder View

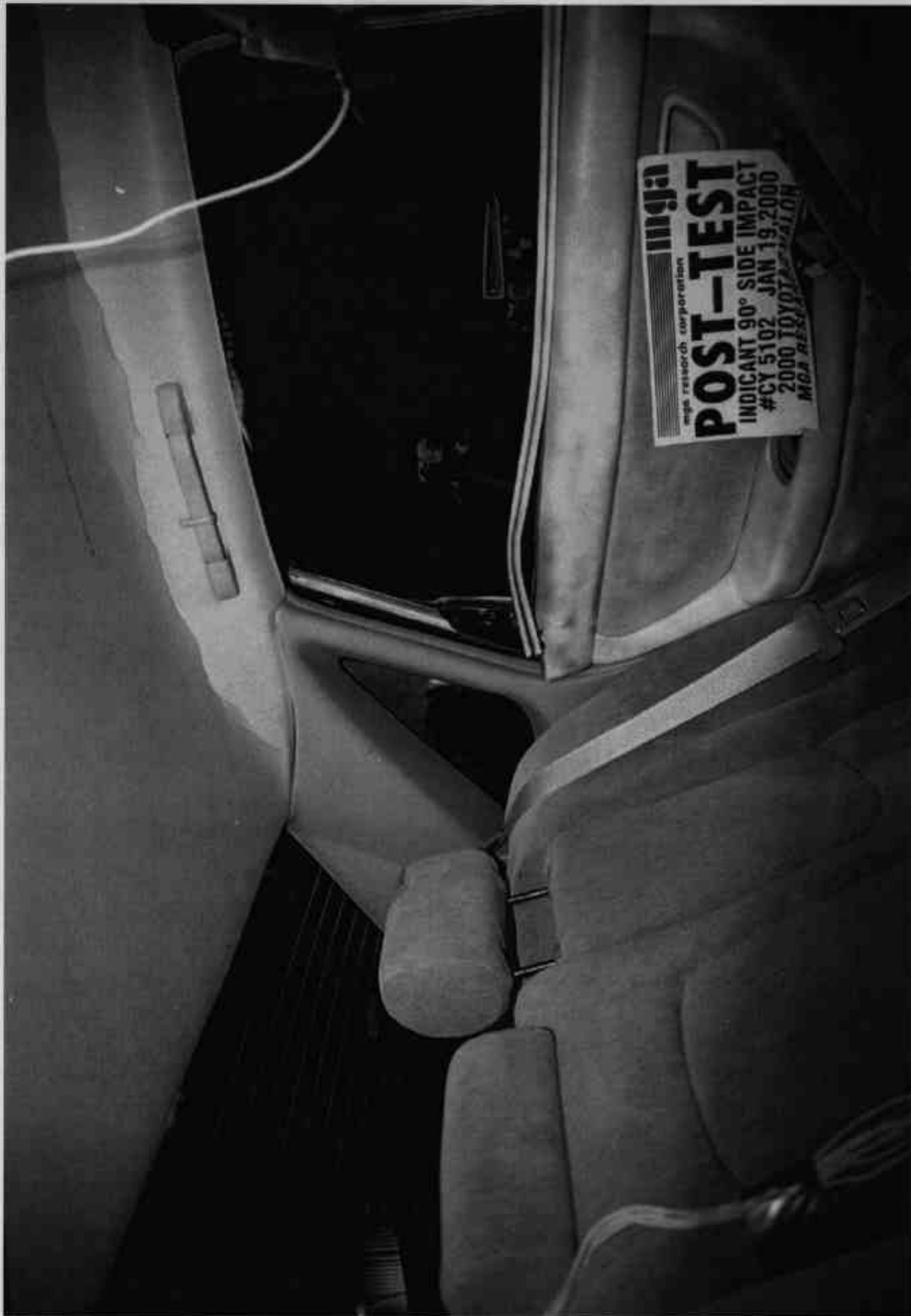


Photo No. A-36 - Post-Test Rear Passenger Dummy Shoulder View



Photo No. A-37 - Post-Test Rear Passenger Dummy Contact

A-37



A-38

Photo No. A-38 - Post-Test Rear Passenger Dummy Head Contact



A-39

Photo No. A-39 - Pre-Test Left Front Impact Point on Vehicle



A-40

Photo No. A-40 - Post-Test Left Front Impact Point on Vehicle

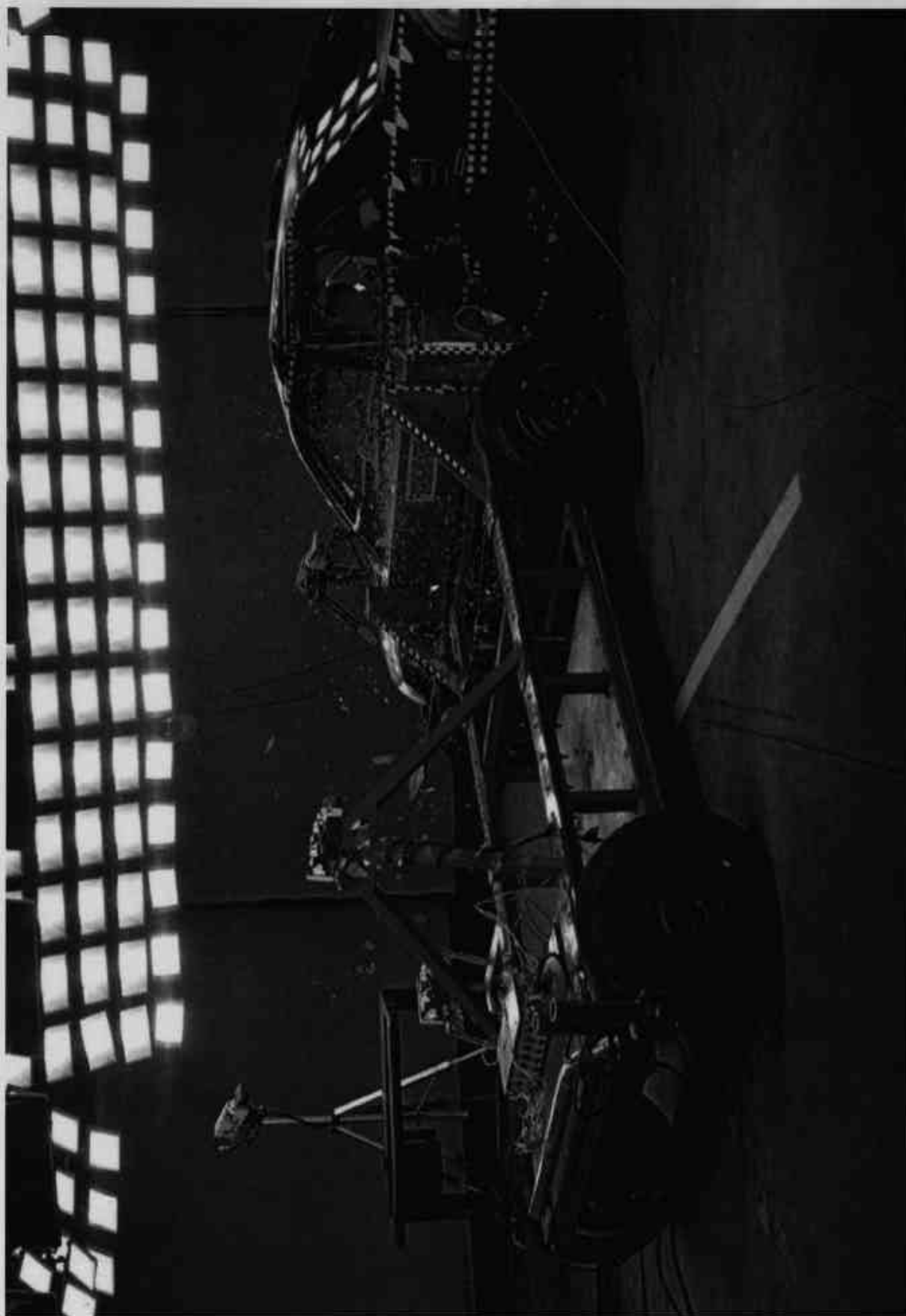


Photo No. A-41 - Impact

A-41



Photo No. A-42 - Vehicle Certification Label

TOYOTA		
VEHICLE CAPACITY WEIGHT: 410 kg (902 lbs)		
OCCUPANT: TOTAL 5 (FRONT 2, REAR 3)		
RECOMMENDED COLD TIRE INFLATION PRESSURE: kPa (psi)		
TIRE SIZE		
UP TO 4 OCCUPANTS	P205/65R15 92H	P205/60R16 91H
VEHICLE CAPACITY WEIGHT	Frt 210 (31), Rt 210 (31)	Frt 220 (32), Rt 220 (32)
SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION	Frt 210 (31), Rt 210 (31)	Frt 220 (32), Rt 220 (32)
CHARGE MAXIMALE DU VEHICULE: 410 kg (902 LIVRES)		
PERSONNES: TOTAL 5 (AVANT 2, ARRIERE 3)		
PRESSION DE PNEUS: kPa (LB/PO ²)		
DIMENSION DES PNEUS	P205/65R15 92H	P205/60R16 91H
AVEC 4 PERSONNES A BORD	AVANT 210 (31), ARRIERE 210 (31)	AVANT 220 (32), ARRIERE 220 (32)
A CHARGE MAXIMALE	AVANT 210 (31), ARRIERE 210 (31)	AVANT 220 (32), ARRIERE 220 (32)
POUR DE PLUS AMPLES DETAILS, VOIR LE MANUEL DU PROPRIETAIRE		
07060		

Photo No. A-43 - Tire Placard

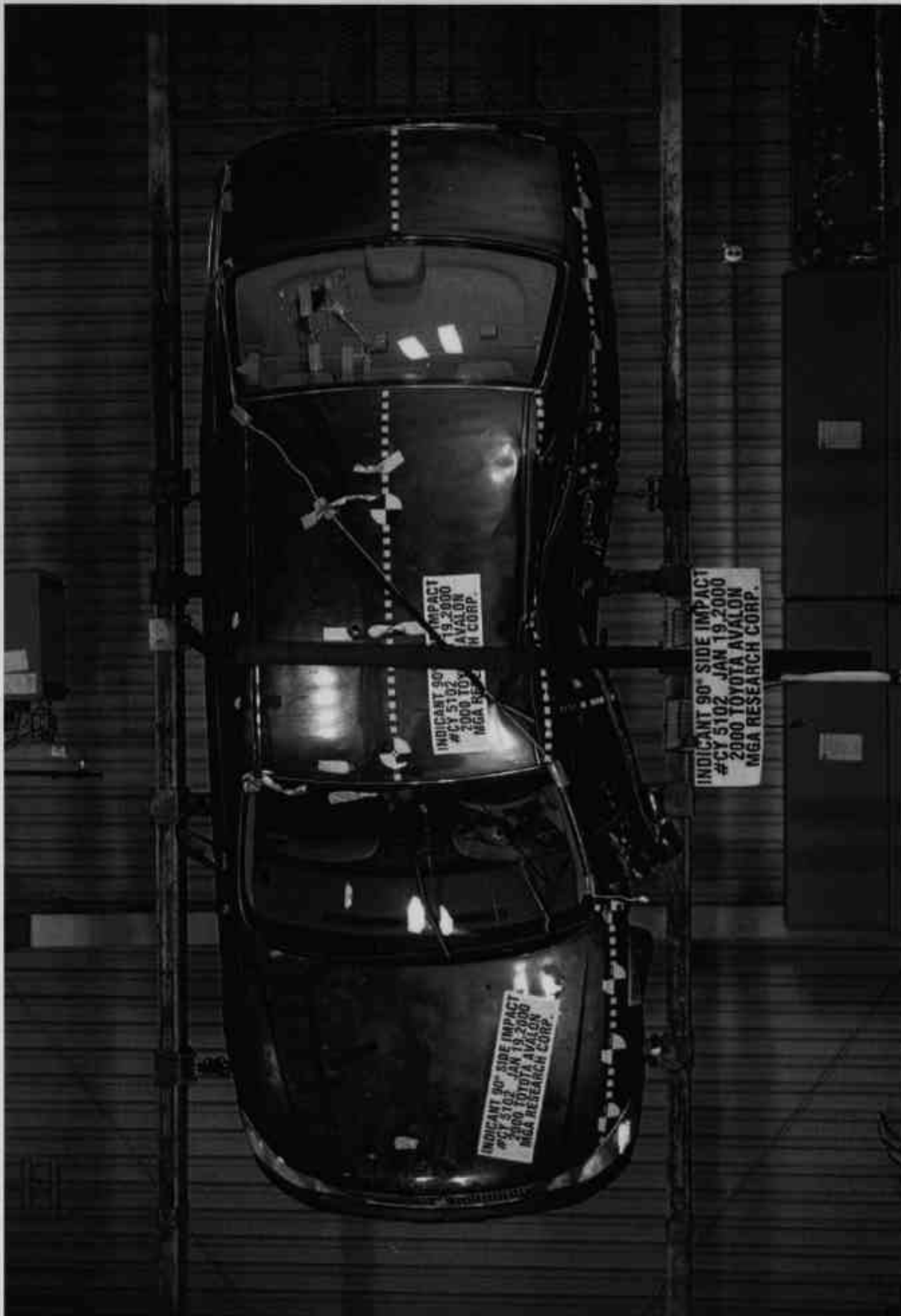


Photo No. A-44 - Rollover 90°

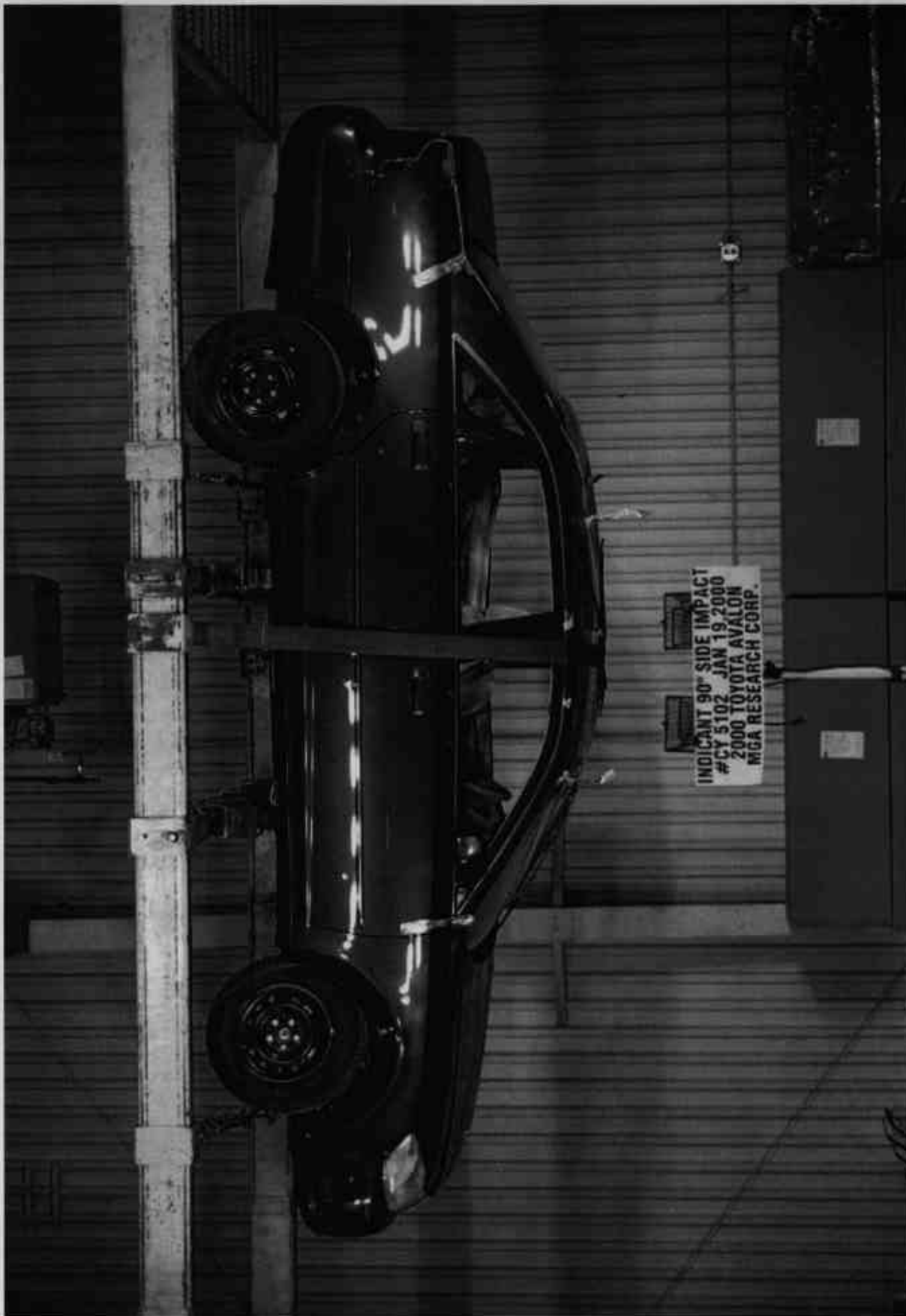
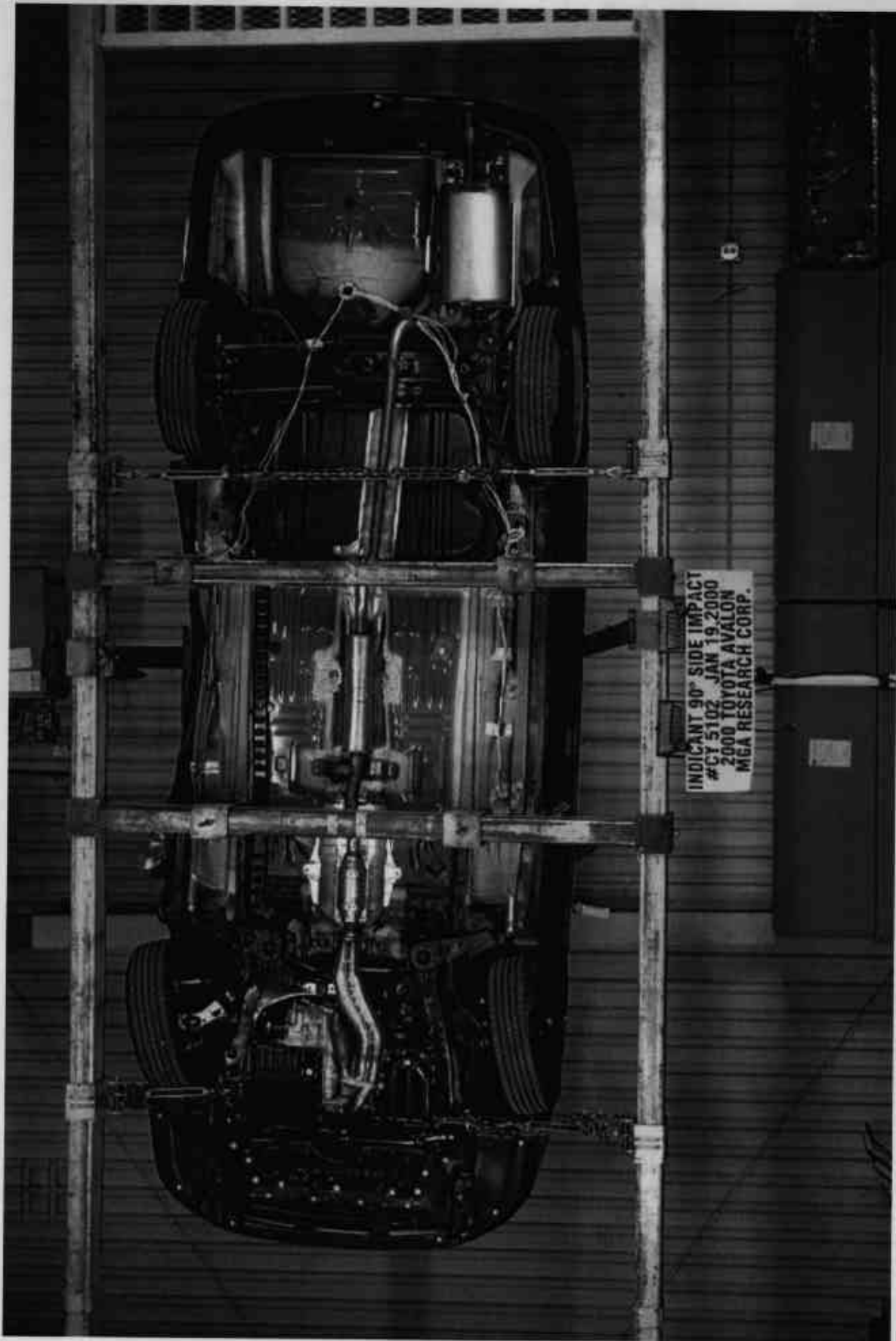


Photo No. A-45 - Rollover 180°

A-45



INDICANT 90° SIDE IMPACT
#CY 5102 JAN 19, 2000
2000 TOYOTA AVALON
MGA RESEARCH CORP.

A-46

Photo No. A-46 - Rollover 270°

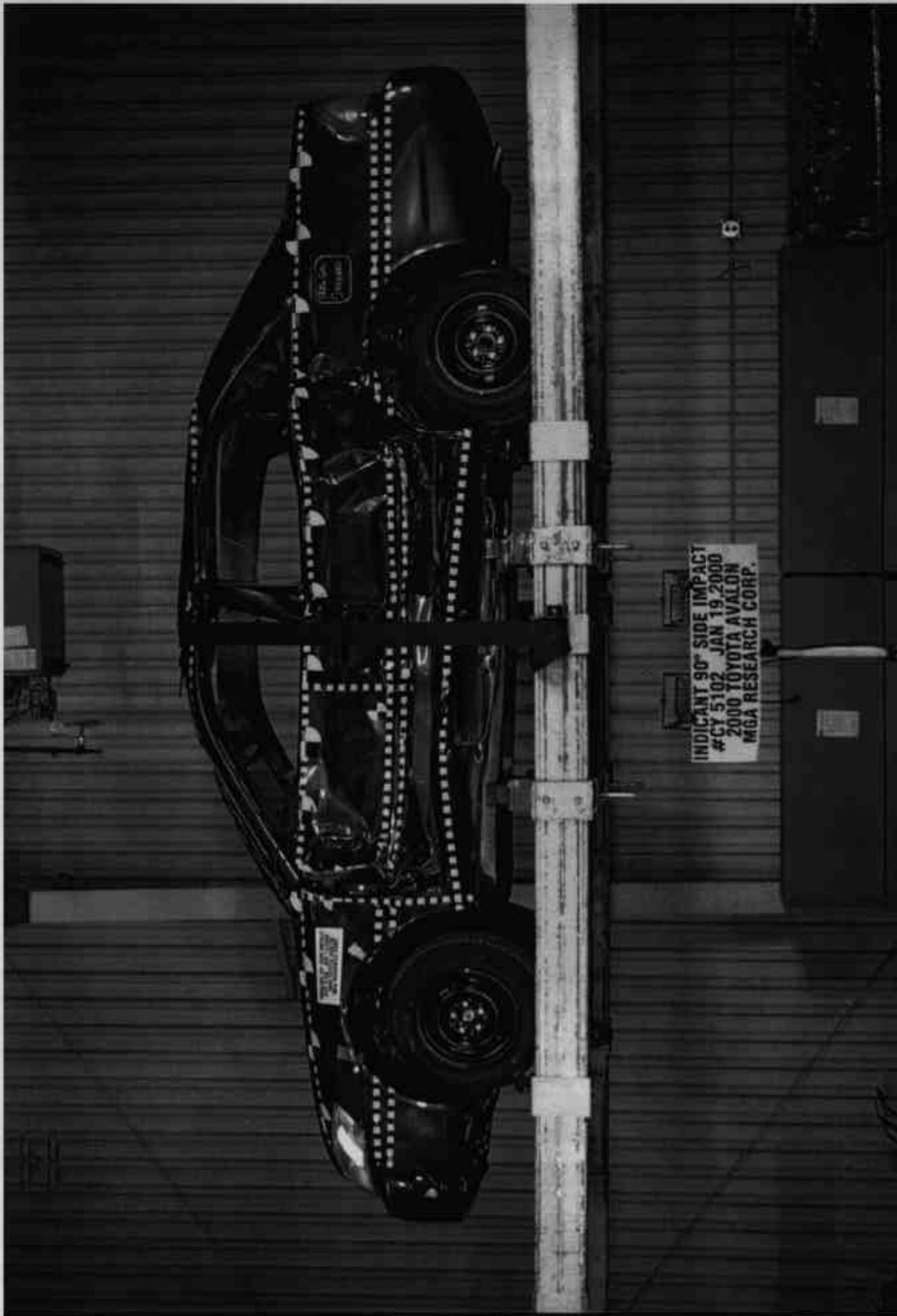


Photo No. A-47 - Rollover 360°

A-47



A-48

Photo No. A-48 - Left Front Attitude Point



A-49

Photo No. A-49 - Right Front Attitude Point



Photo No. A-50 - Left Rear Attitude Point

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Photo No. A-51 - Right Rear Attitude Point

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* Data is questionable

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* Accelerometer separated from vehicle at approximately 20 msec.

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* Accelerometer separated from vehicle at approximately 20 msec.

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TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

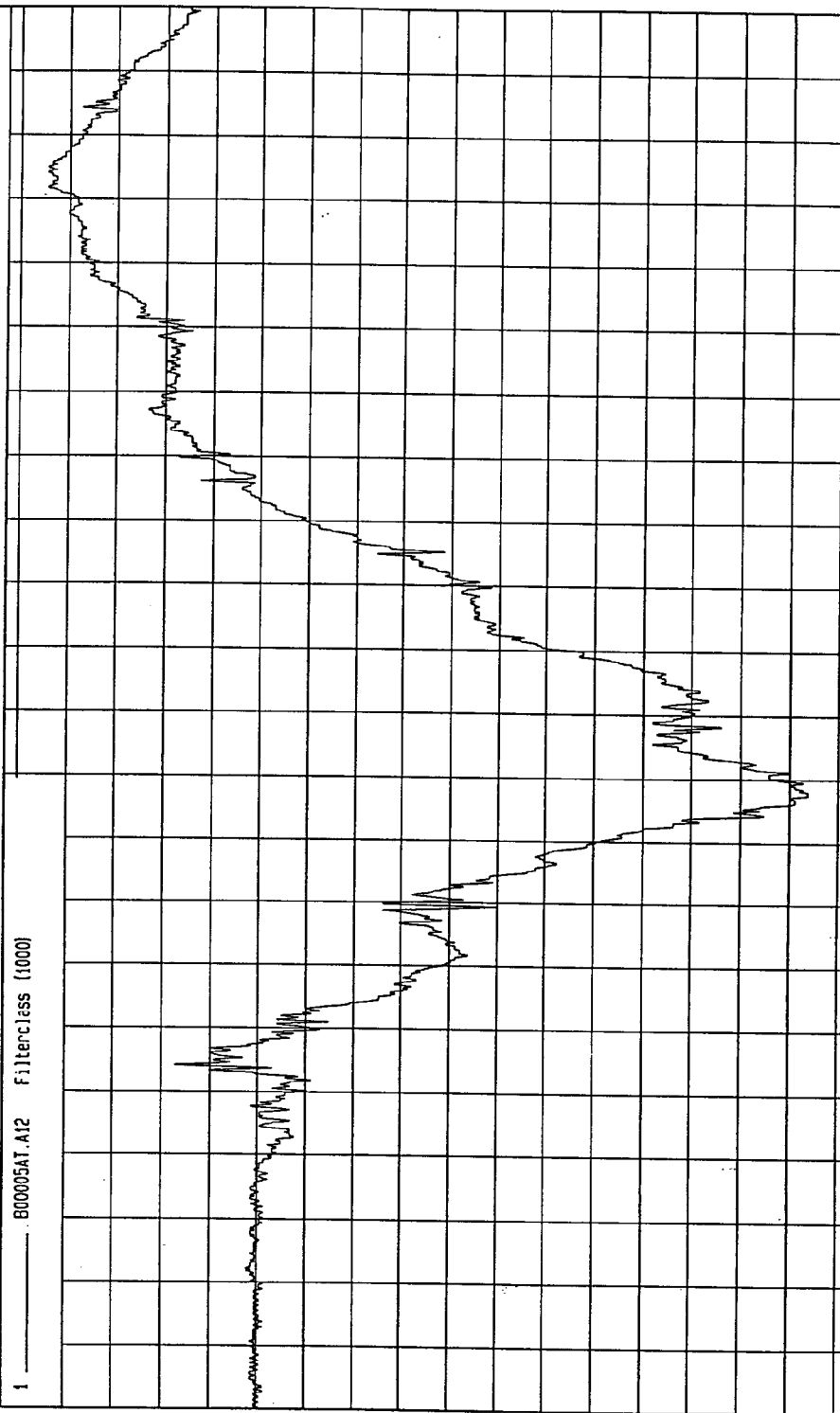
Minimum = -22.75 G'S at 78 msec

Maximum = 8.93 G'S at 172 msec

DRIVER HEAD X ACCELERATION

1 _____ B00005AT.A12 Filterclass (1000)

G



TIME (SECONDS)

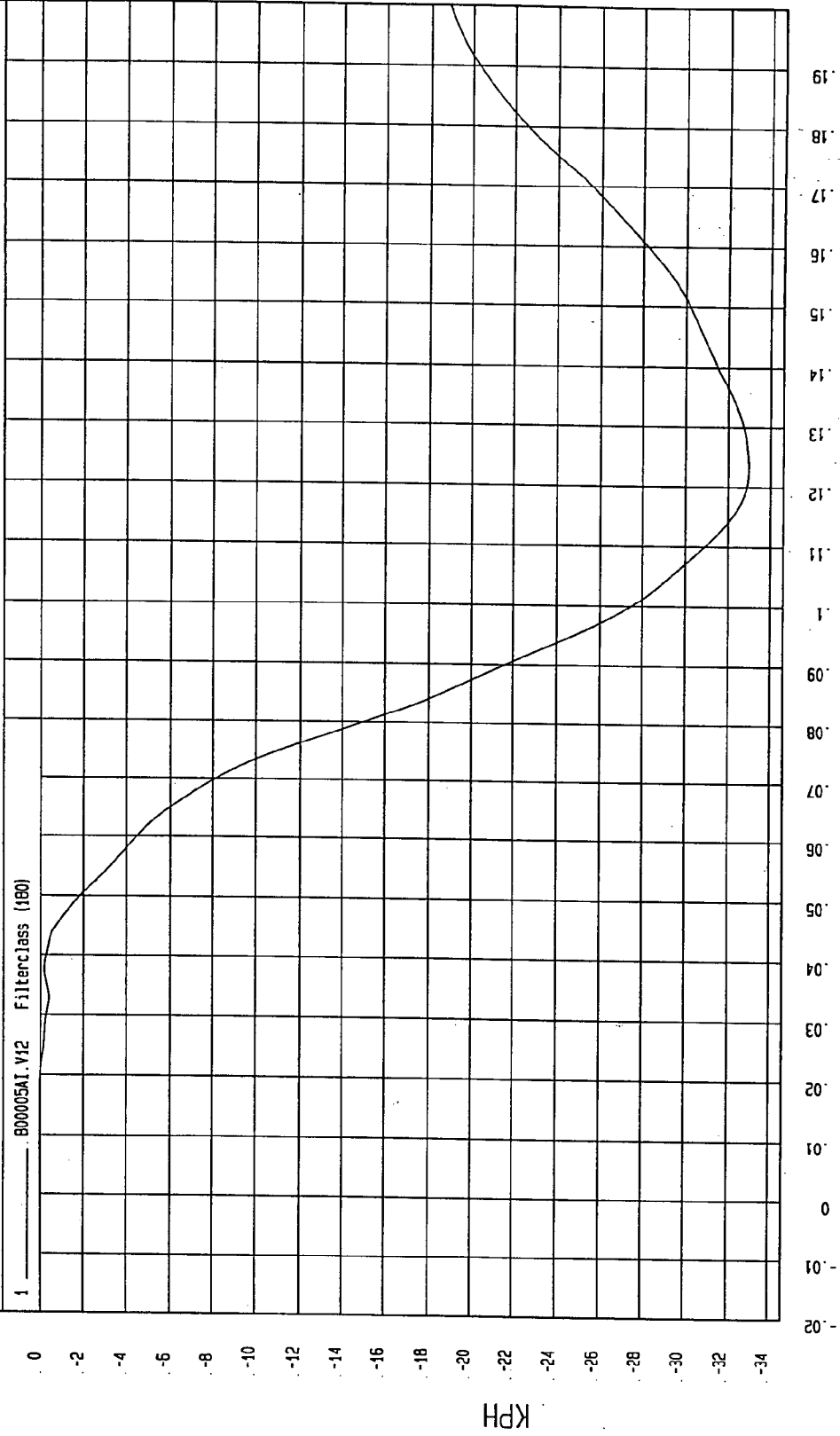
MCA Research
01-19-2000 14:49

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -32.97 KPH at 123 msec Maximum = 5.51E-02 KPH at 15 msec

DRIVER HEAD X VELOCITY



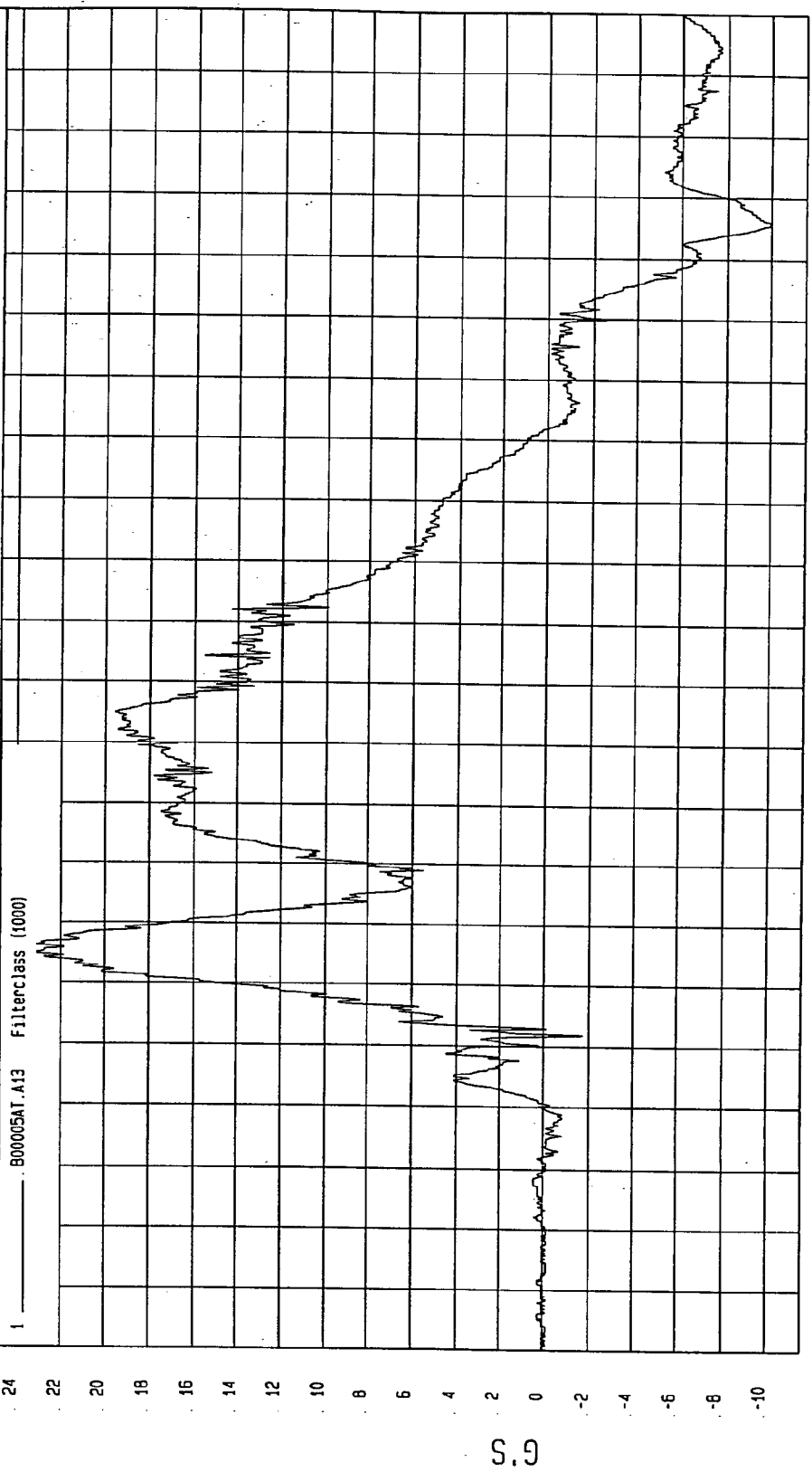
NCA Research
01-19-2000 14:49

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -9.97 G'S at 166 msec Maximum = 23.1 G'S at 45 msec

DRIVER HEAD Y ACCELERATION



NGA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

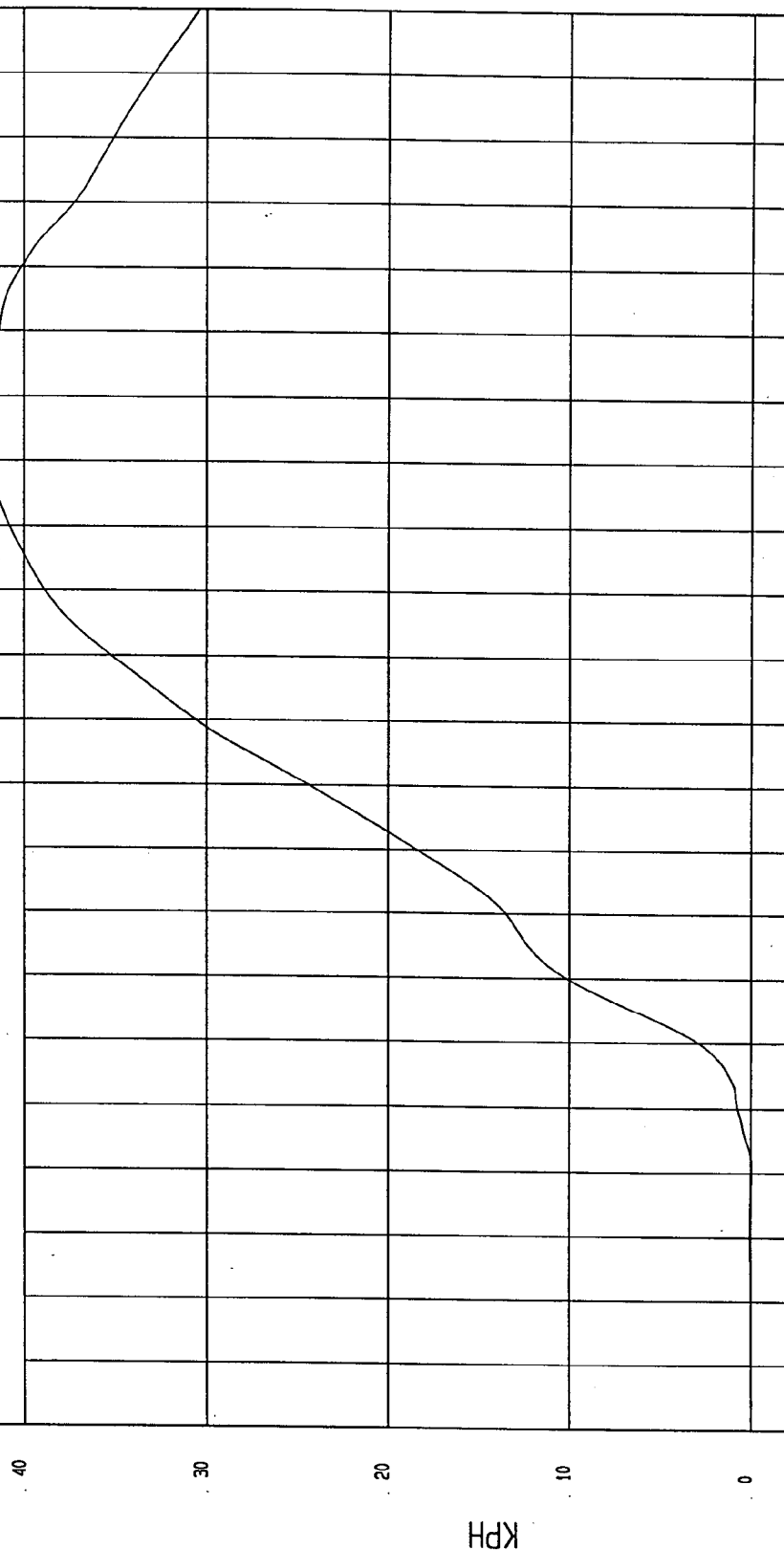
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 41.87 KPH at 132 msec

Minimum = -0.05 KPH at 20 msec

DRIVER HEAD Y VELOCITY

1 — 800005A1.V13 Filterclass (180)



WGA Research
01-19-2000 14:50

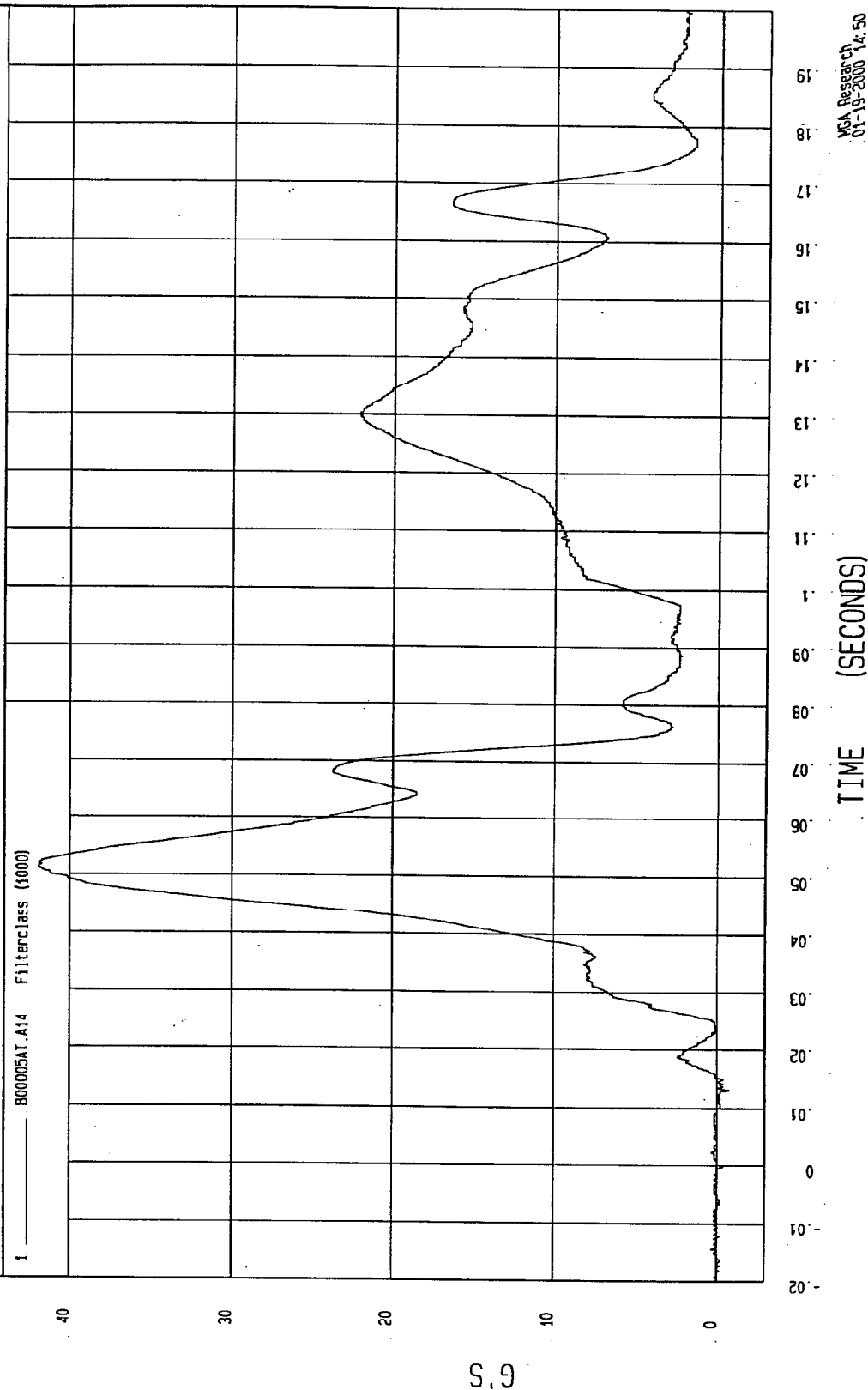
TIME Seconds

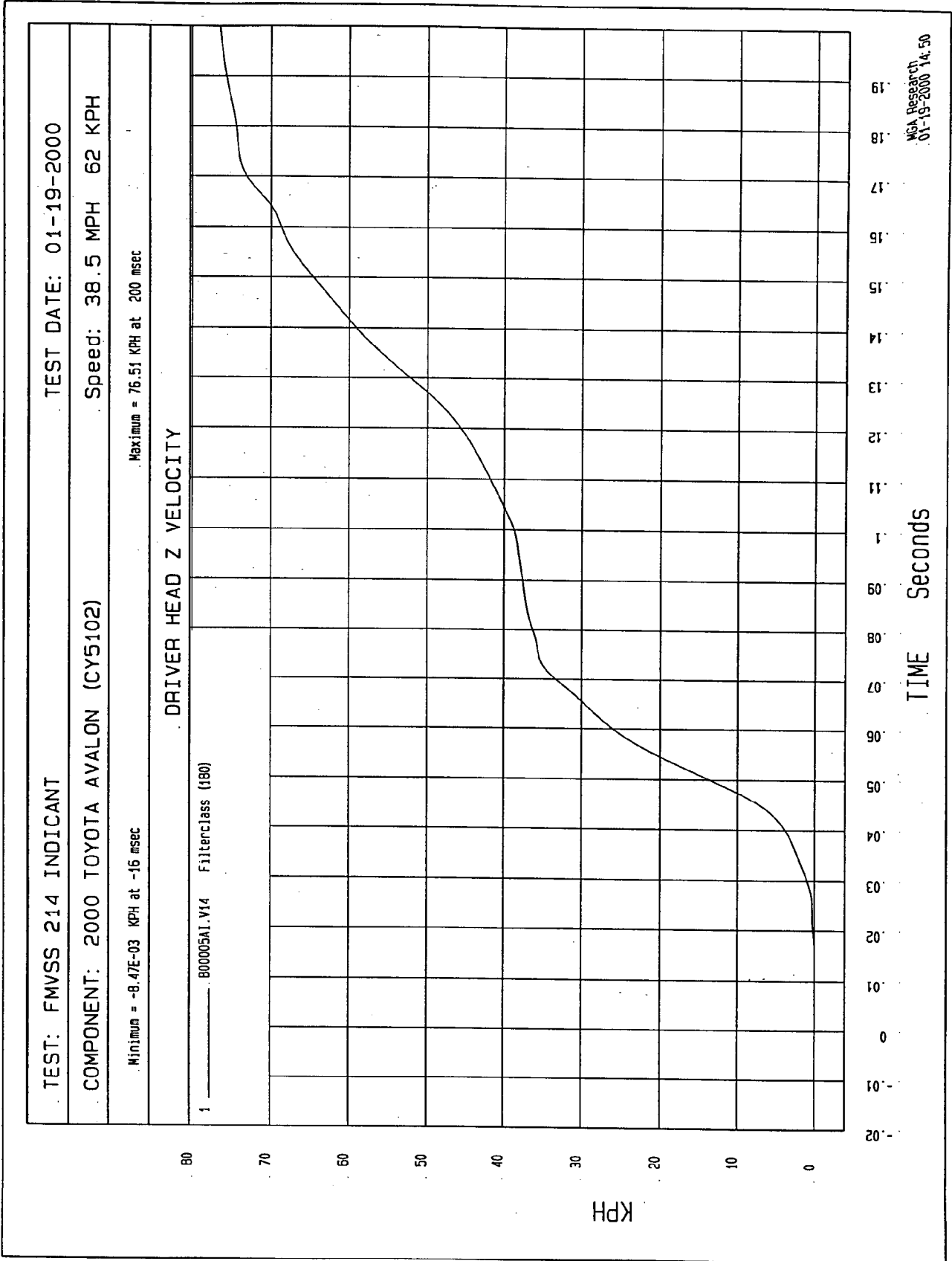
TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

Maximum = 41.9 G'S at 51 msec

DRIVER HEAD Z ACCELERATION



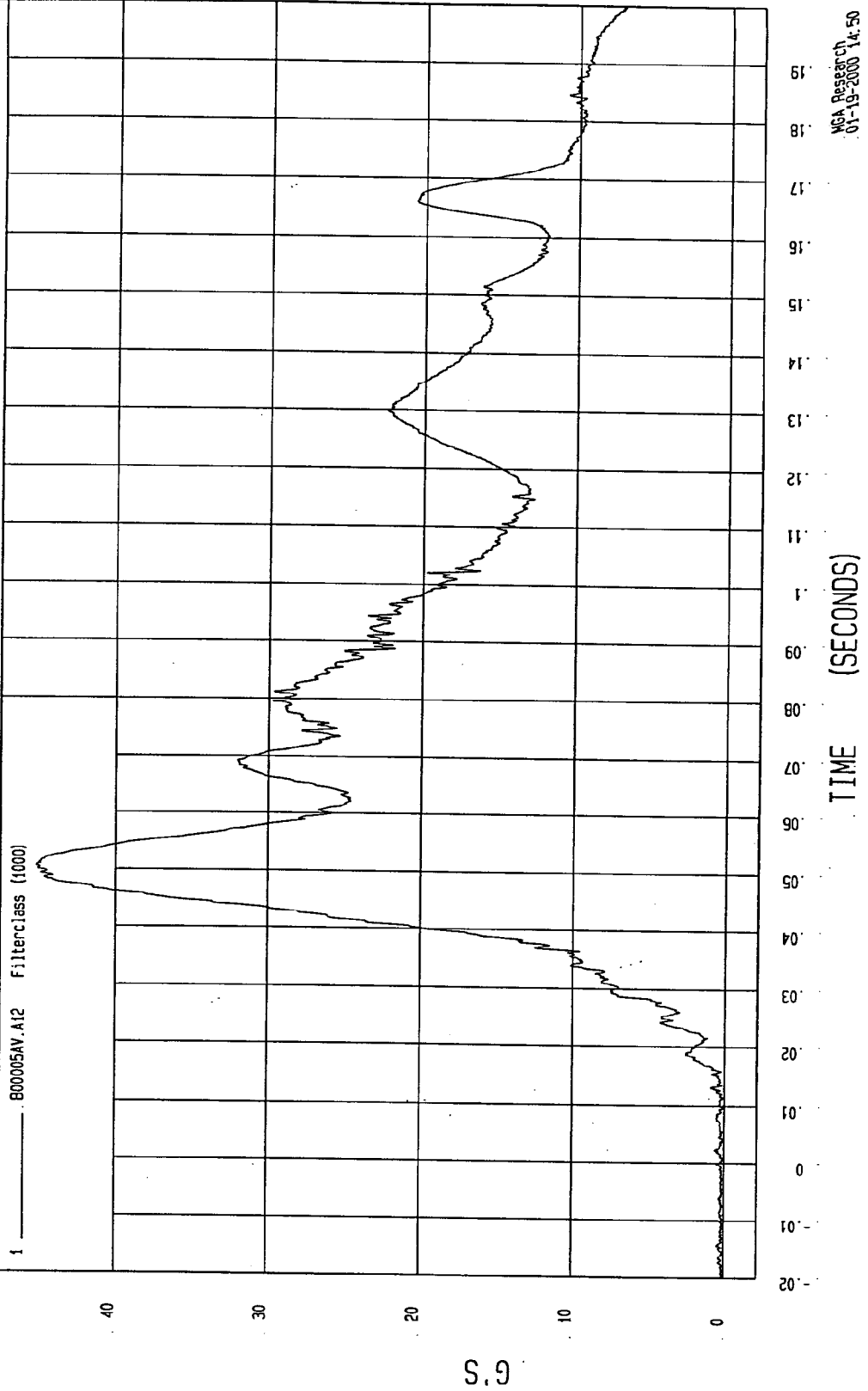


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = .1 G'S at -20 msec Maximum = 45.27 G'S at 51 msec

DRIVER HEAD RESULTANT



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

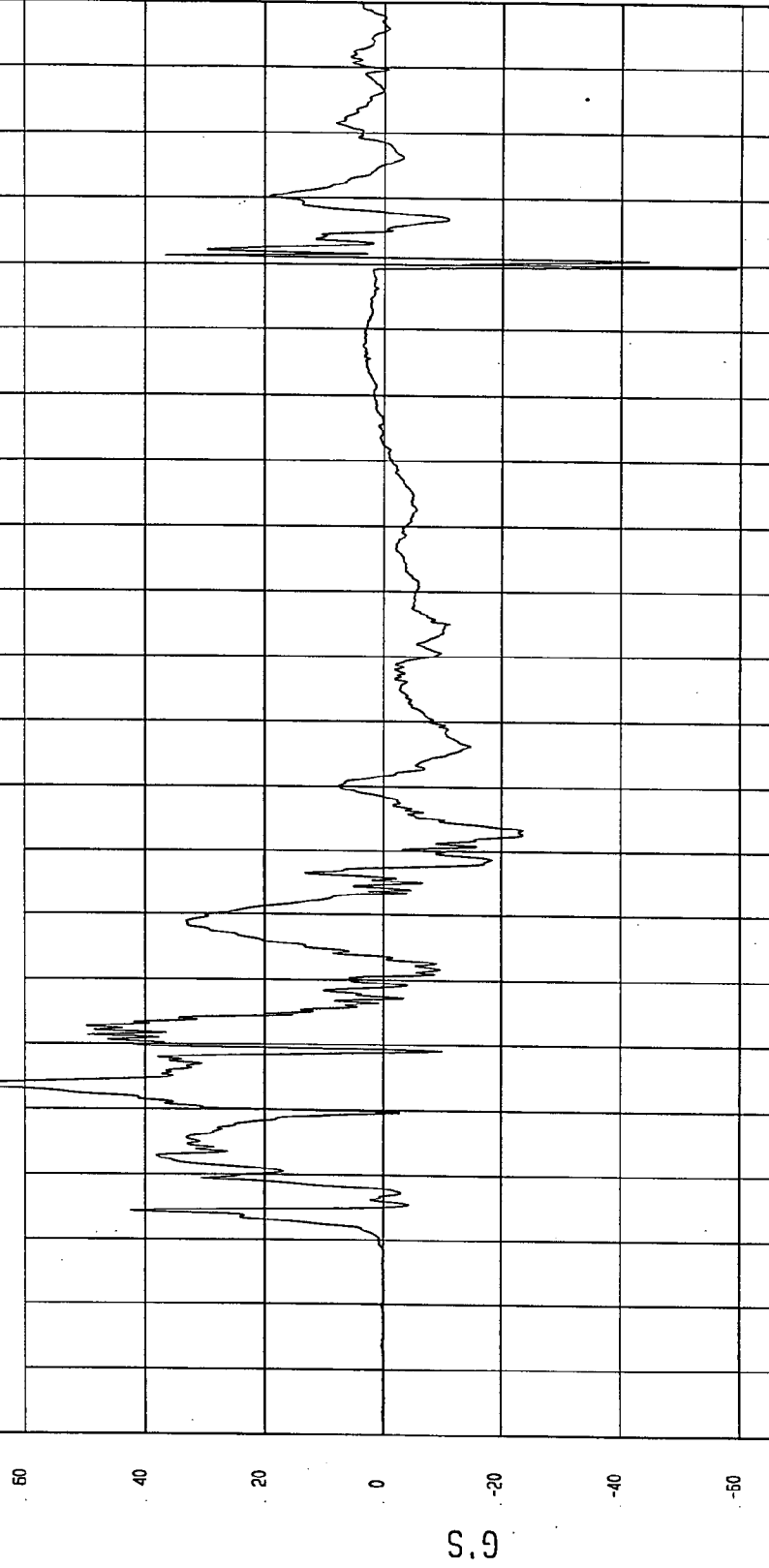
Speed: 38.5 MPH 62 KPH

Minimum = -59.21 G'S at 160 msec

Maximum = 70.79 G'S at 34 msec

DRIVER UPPER RIB Y ACCELERATION

1 _____ B00005AT.A15 Filterclass (1000)



19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2

TIME (SECONDS)

NGA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

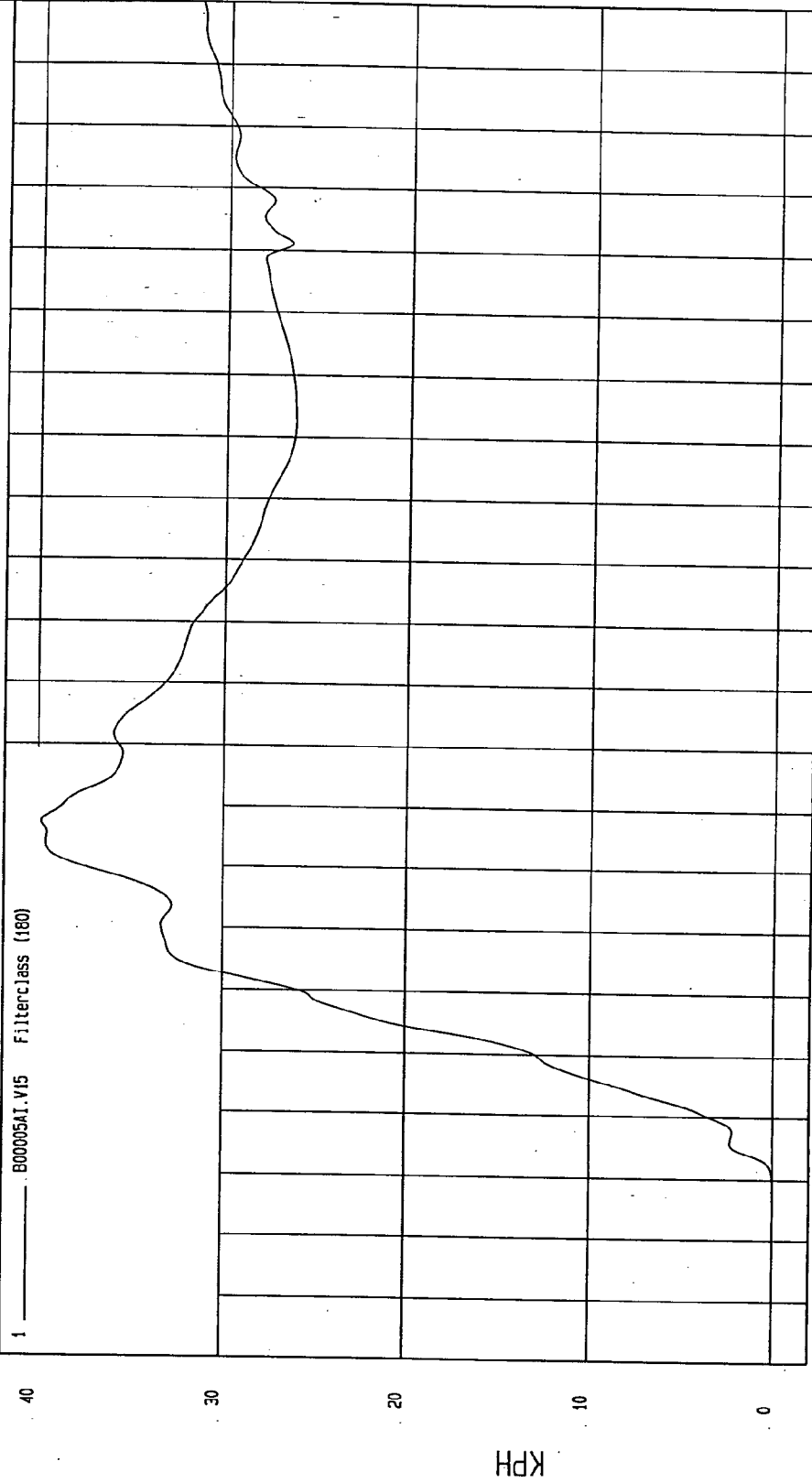
Speed: 38.5 MPH 62 KPH

Minimum = -9.14E-03 KPH at -8 msec

Maximum = 39.82 KPH at 67 msec

DRIVER UPPER RIB Y VELOCITY

1 ——— B00005A1.V15 Filterclass (180)



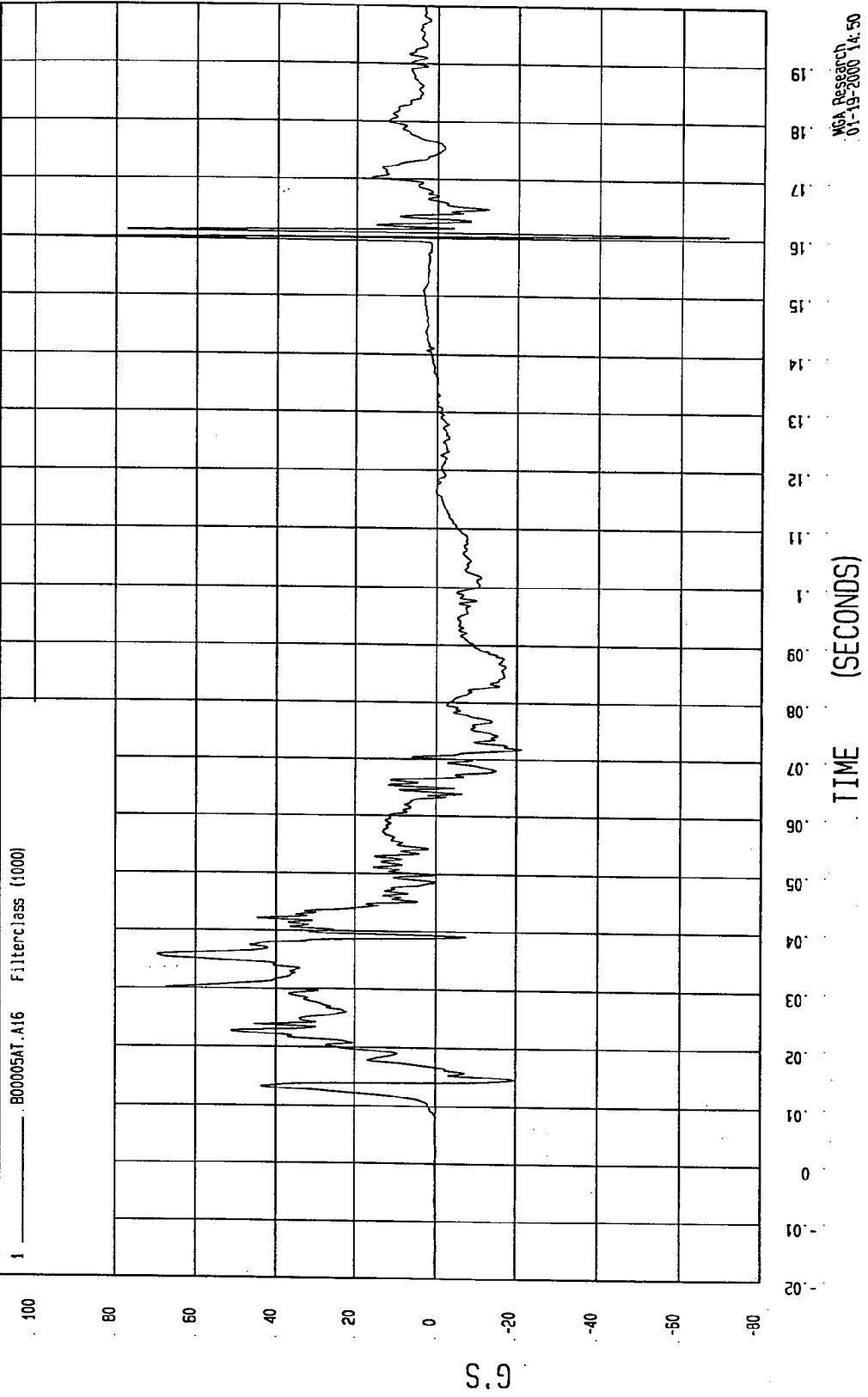
MGA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -71.52 G'S at 161 msec Maximum = 99.92 G'S at 160 msec

DRIVER LOWER RIB Y ACCELERATION

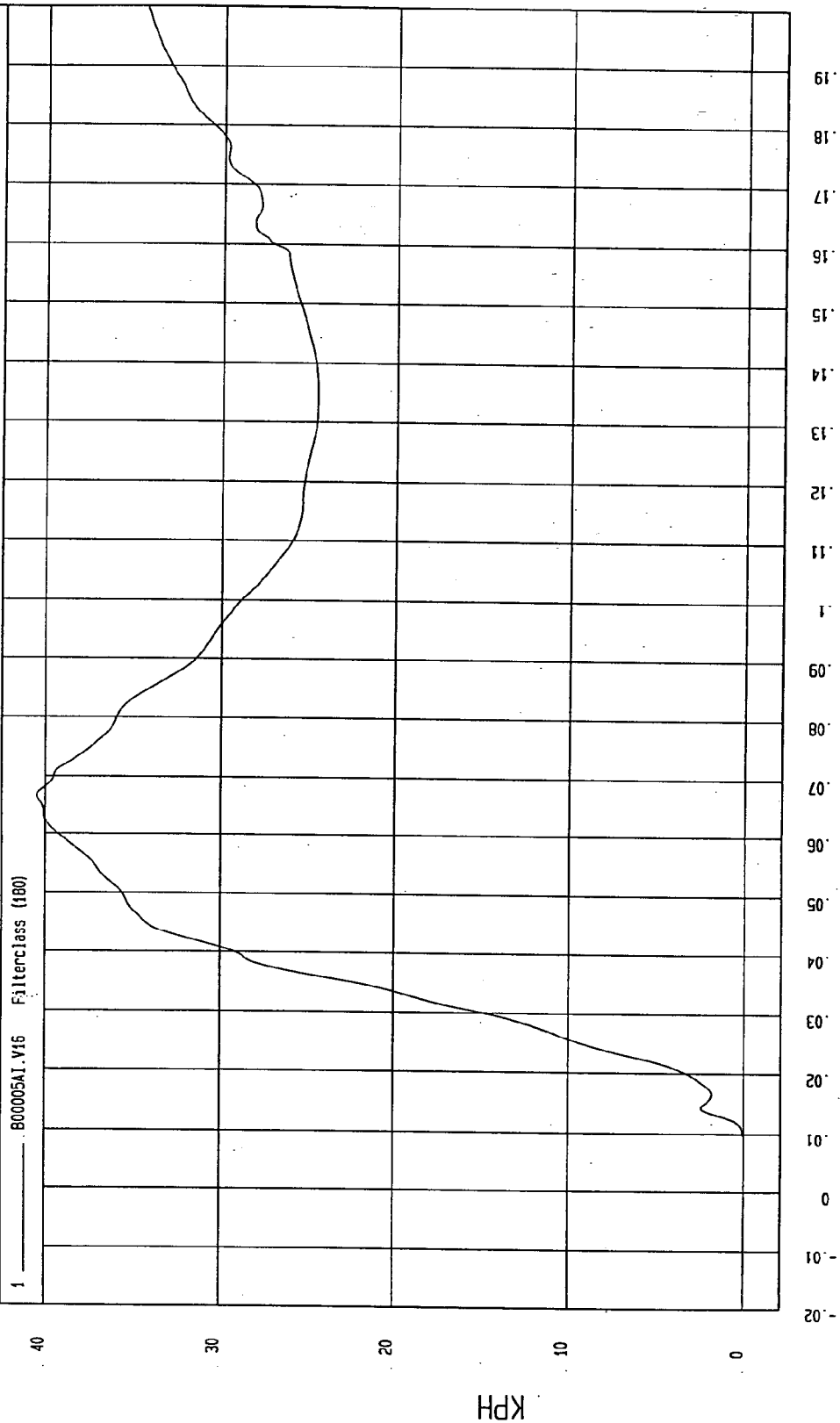


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -02 KPH at -8 msec Maximum = 40.47 KPH at 67 msec

DRIVER LOWER RIB Y VELOCITY



MSA Research
01-19-2000 14:50

TIME Seconds

KPH

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

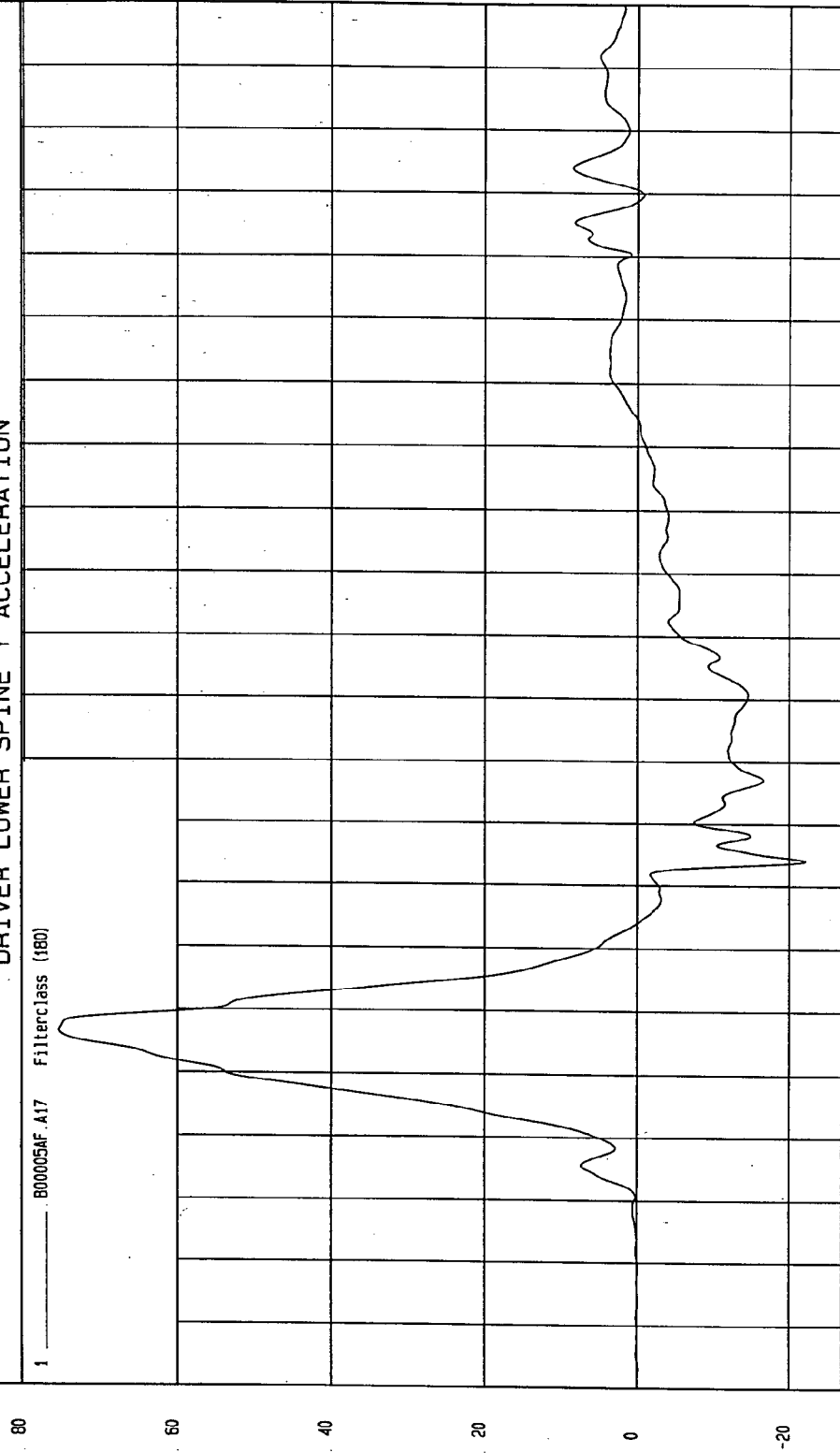
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 75.46 G'S at 36 msec

Minimum = -22.17 G'S at 64 msec

DRIVER LOWER SPINE Y ACCELERATION

1 B00005AF A17 FilterClass (180)



NGA Research
01-19-2000 14:50

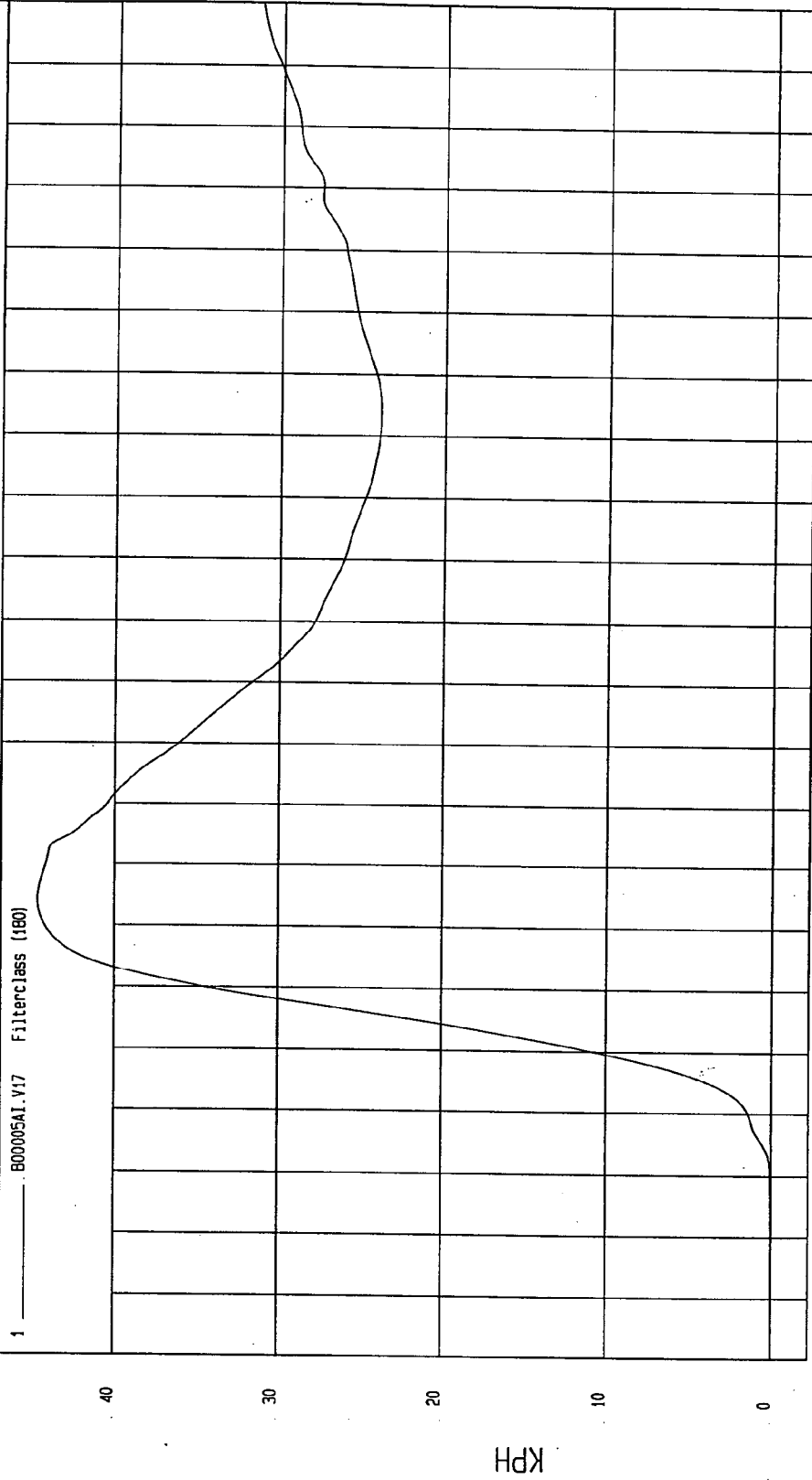
TIME (SECONDS)

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

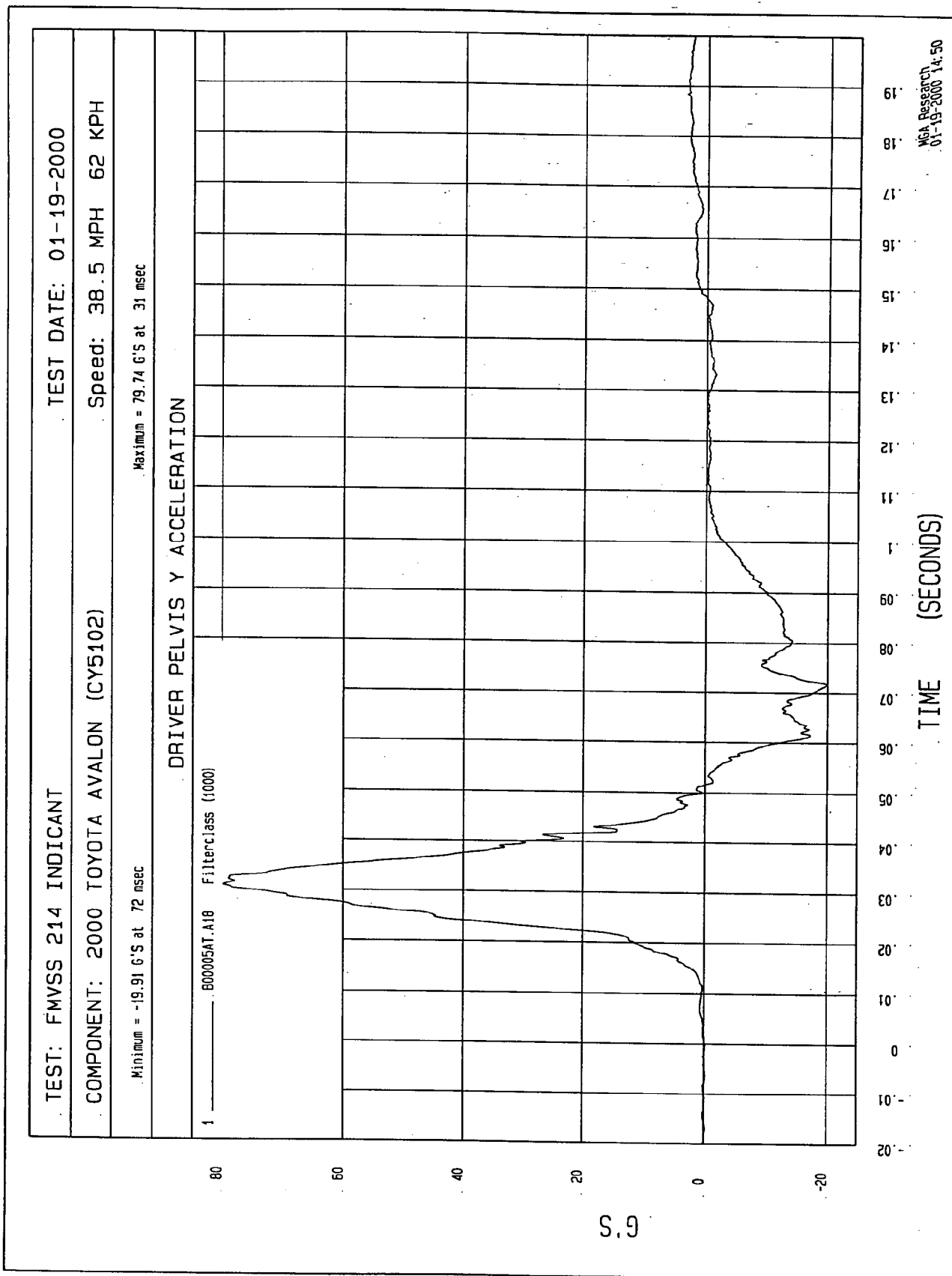
Minimum = -7.13E-03 KPH at -16 msec Maximum = 44.68 KPH at 54 msec

DRIVER LOWER SPINE Y VELOCITY



TIME Seconds

MCA Research
01-19-2000 14:50

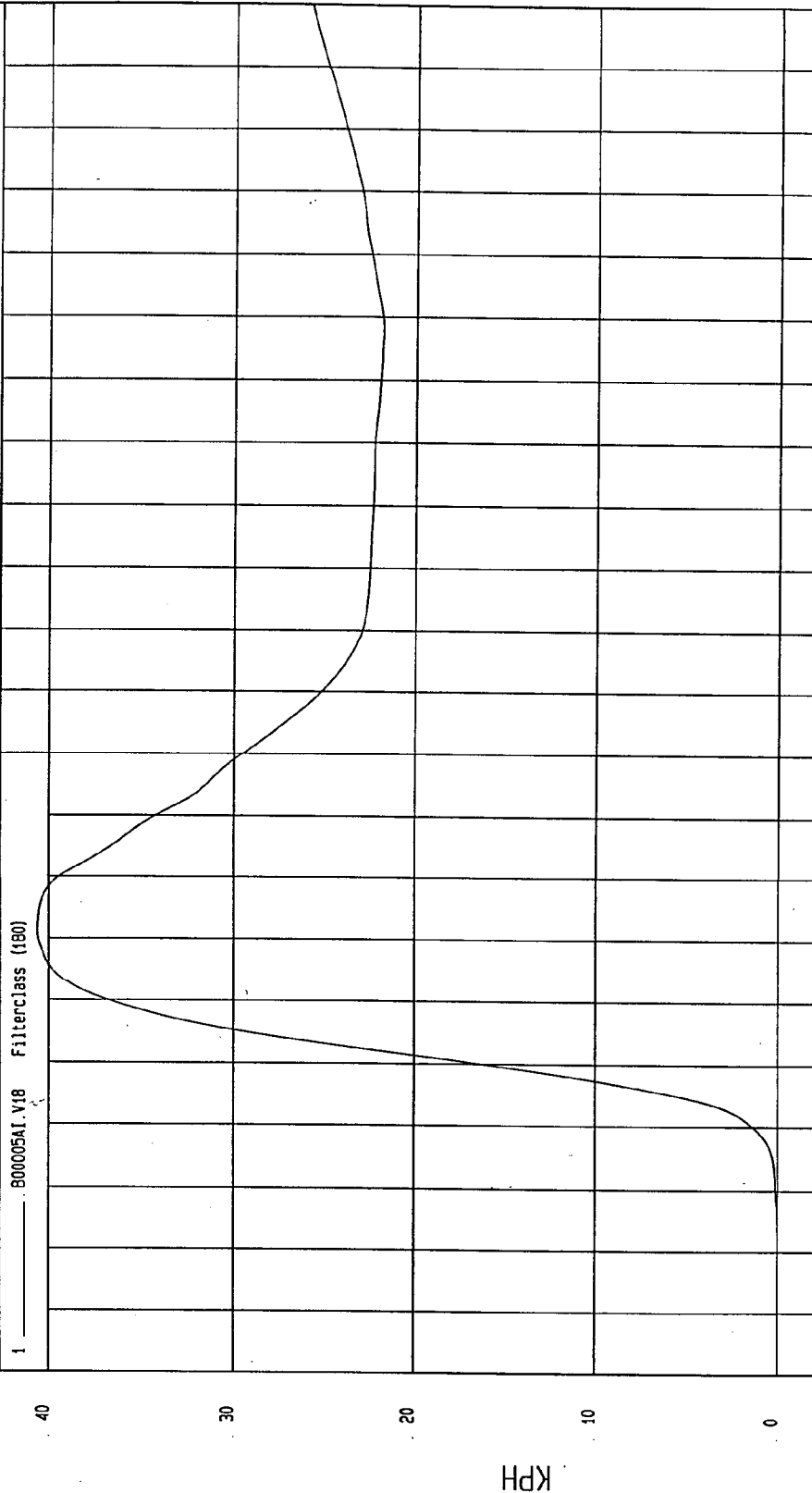


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -6.92E-03 KPH at -16 msec Maximum = 40.62 KPH at 52 msec

DRIVER PELVIS Y VELOCITY



TIME Seconds

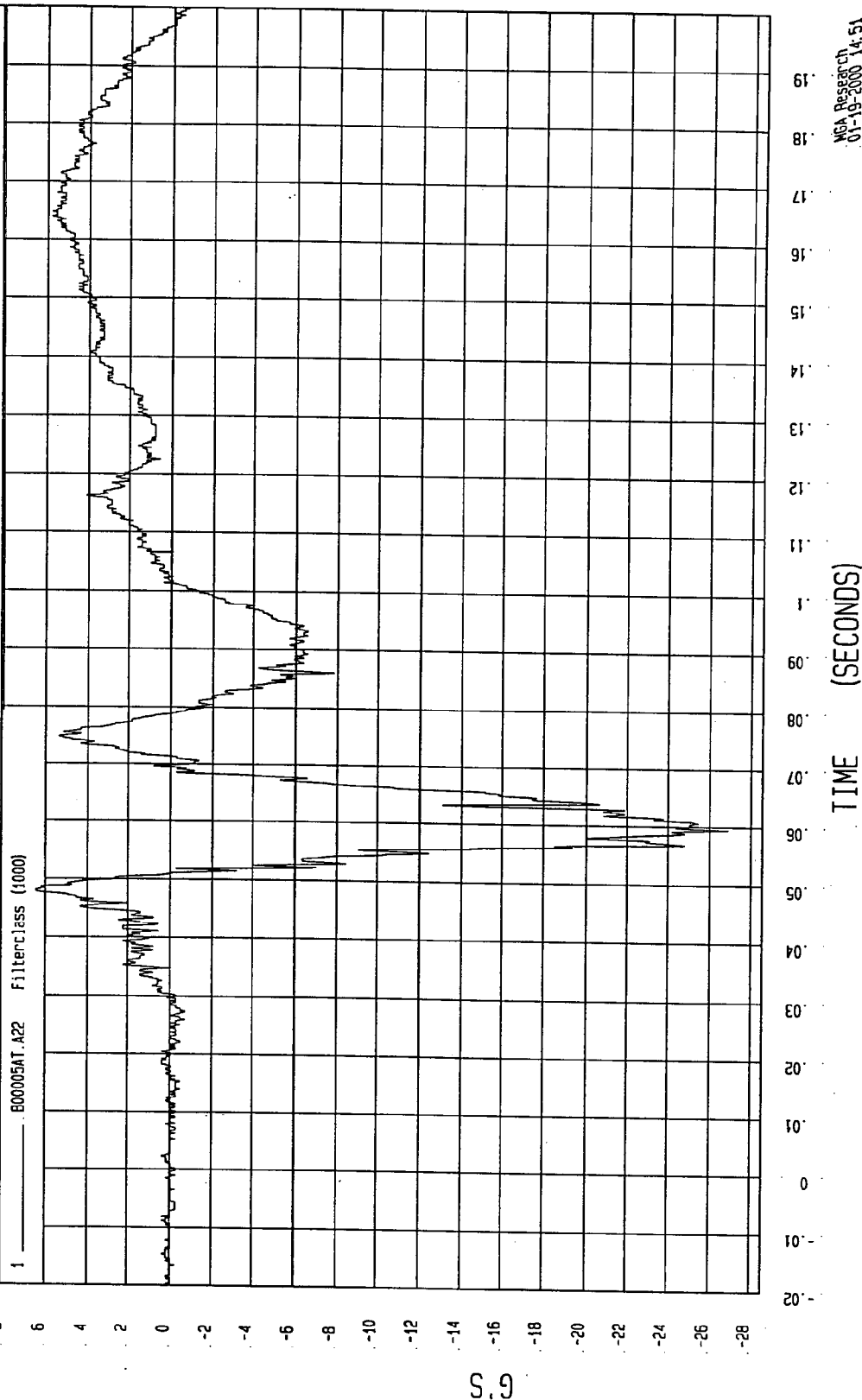
NCA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -26.89 G'S at 60 msec Maximum = 6.43 G'S at 48 msec

REAR PASSENGER HEAD X ACCELERATION

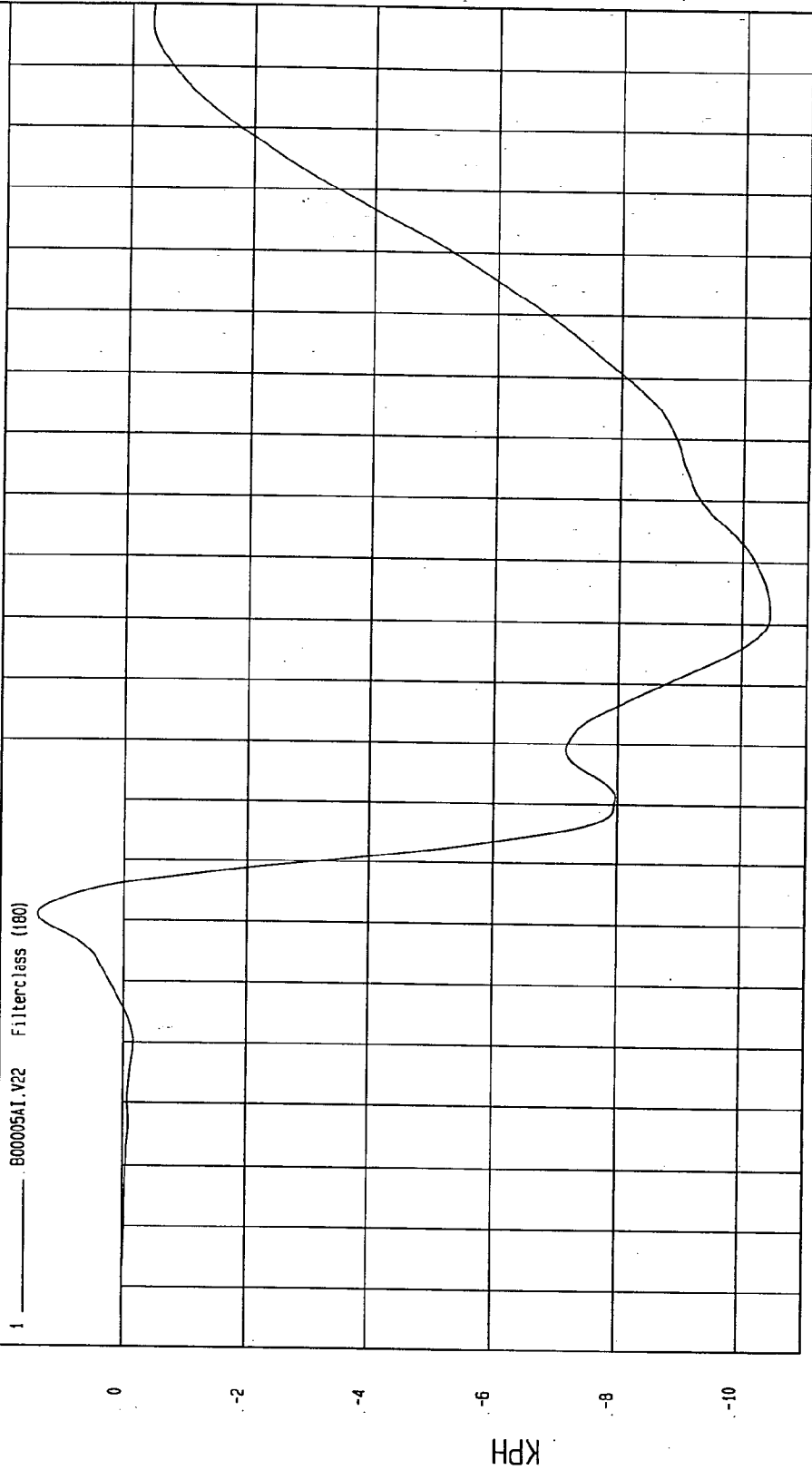


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -10.46 KPH at 102 msec Maximum = 1.4 KPH at 51 msec

REAR PASSENGER HEAD X VELOCITY



MGA Research
01-19-2000 14:51

TIME Seconds

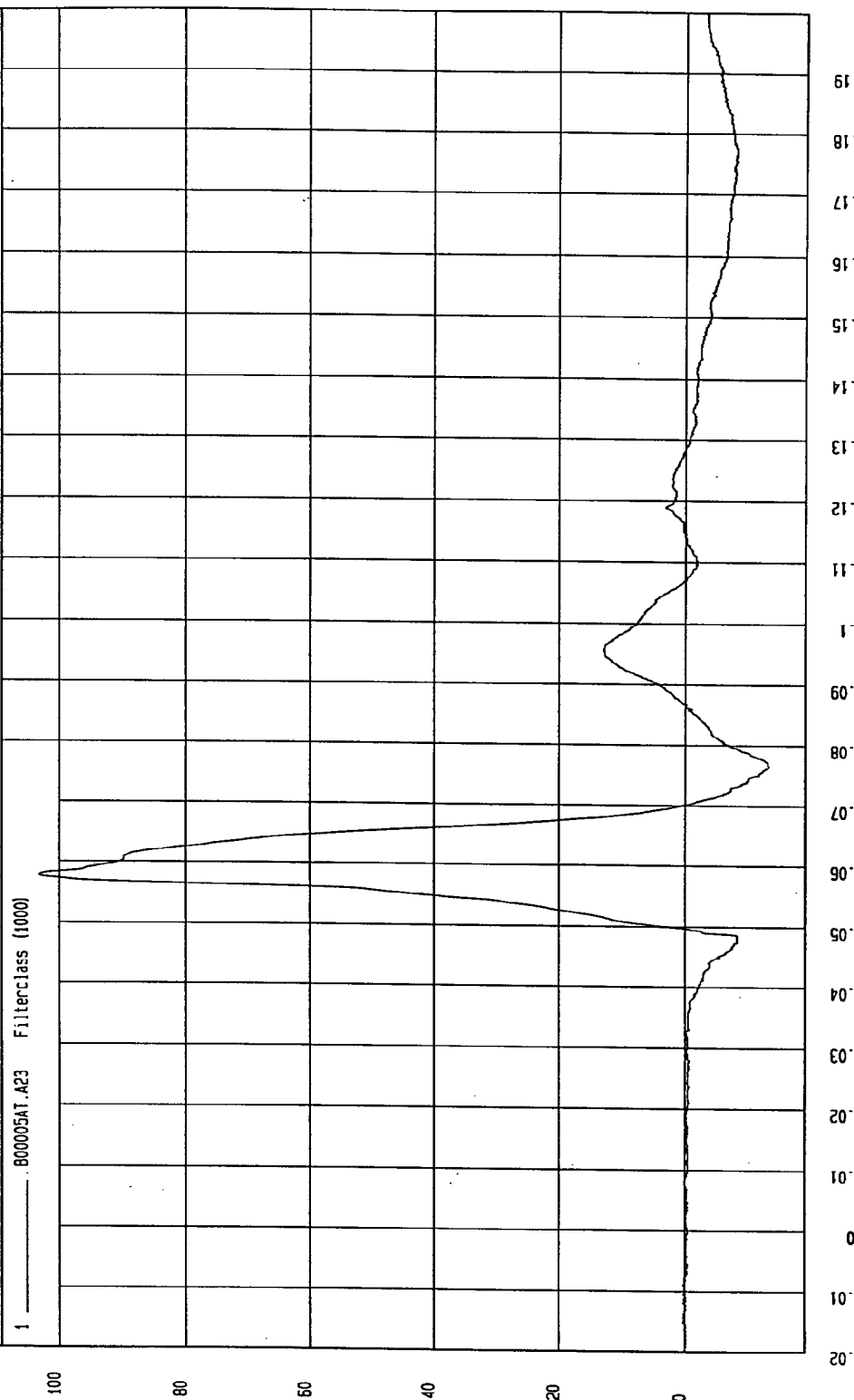
KPH

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -13.08 G'S at 76 msec Maximum = 103.16 G'S at 58 msec

REAR PASSENGER HEAD Y ACCELERATION



MSA Research
01-19-2000 14:51

TIME (SECONDS)

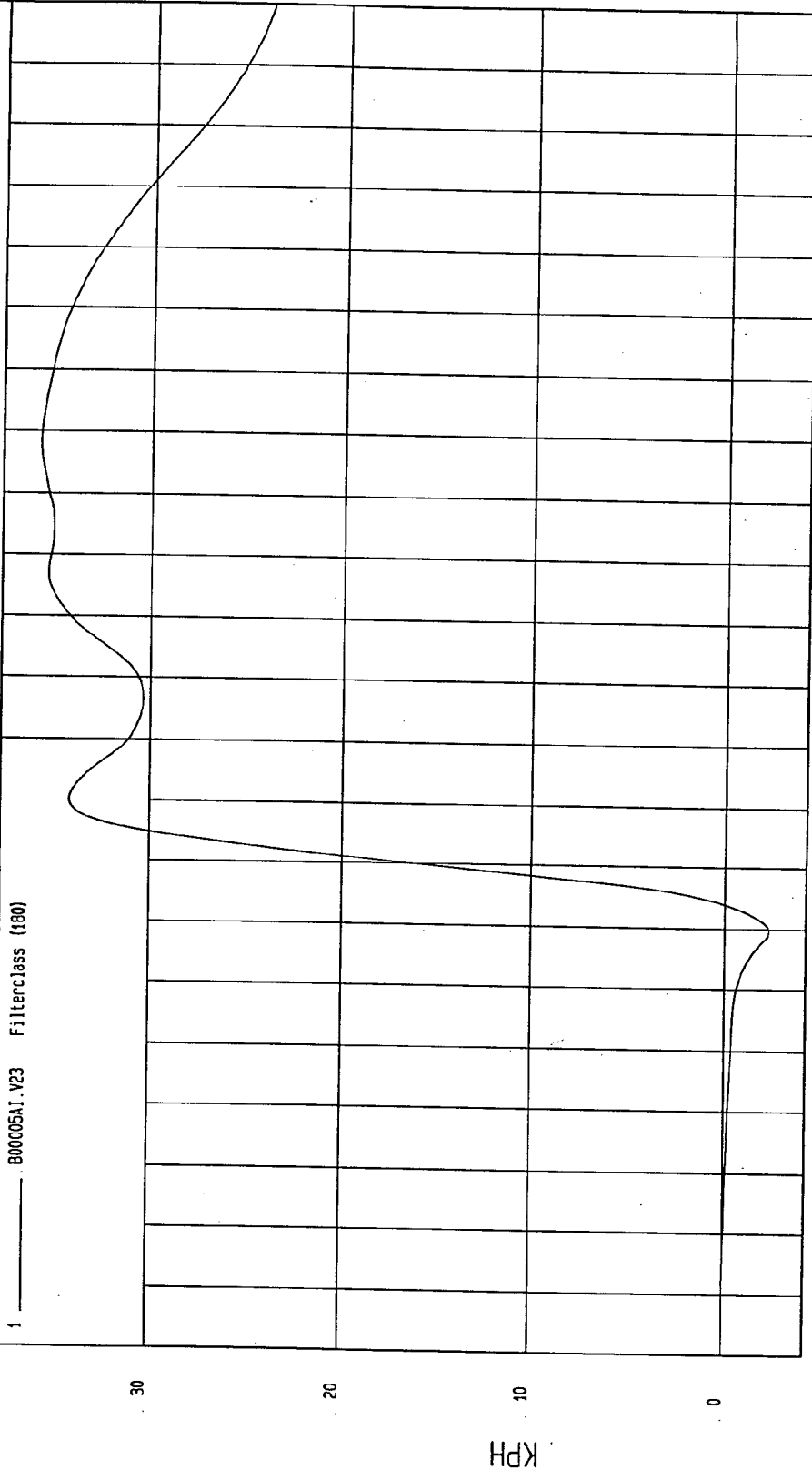
G's

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -2.25 KPH at 50 msec Maximum = 35.8 KPH at 128 msec

REAR PASSENGER HEAD Y VELOCITY



NCA Research
01-19-2000 14:51

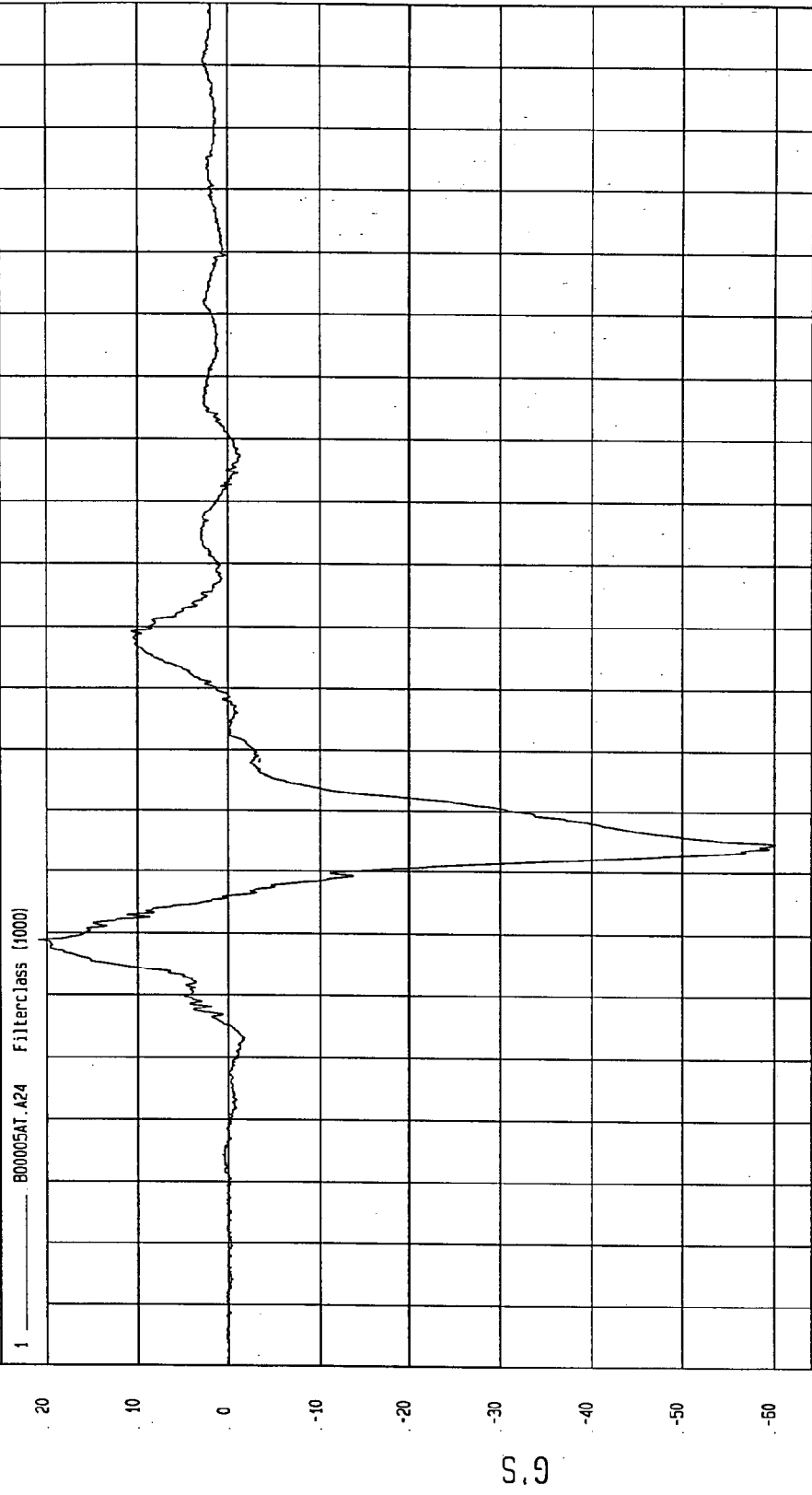
TIME Seconds

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -60.13 G'S at 65 msec Maximum = 20.95 G'S at 49 msec

REAR PASSENGER HEAD Z ACCELERATION



WCA Research
01-19-2000 14:51

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

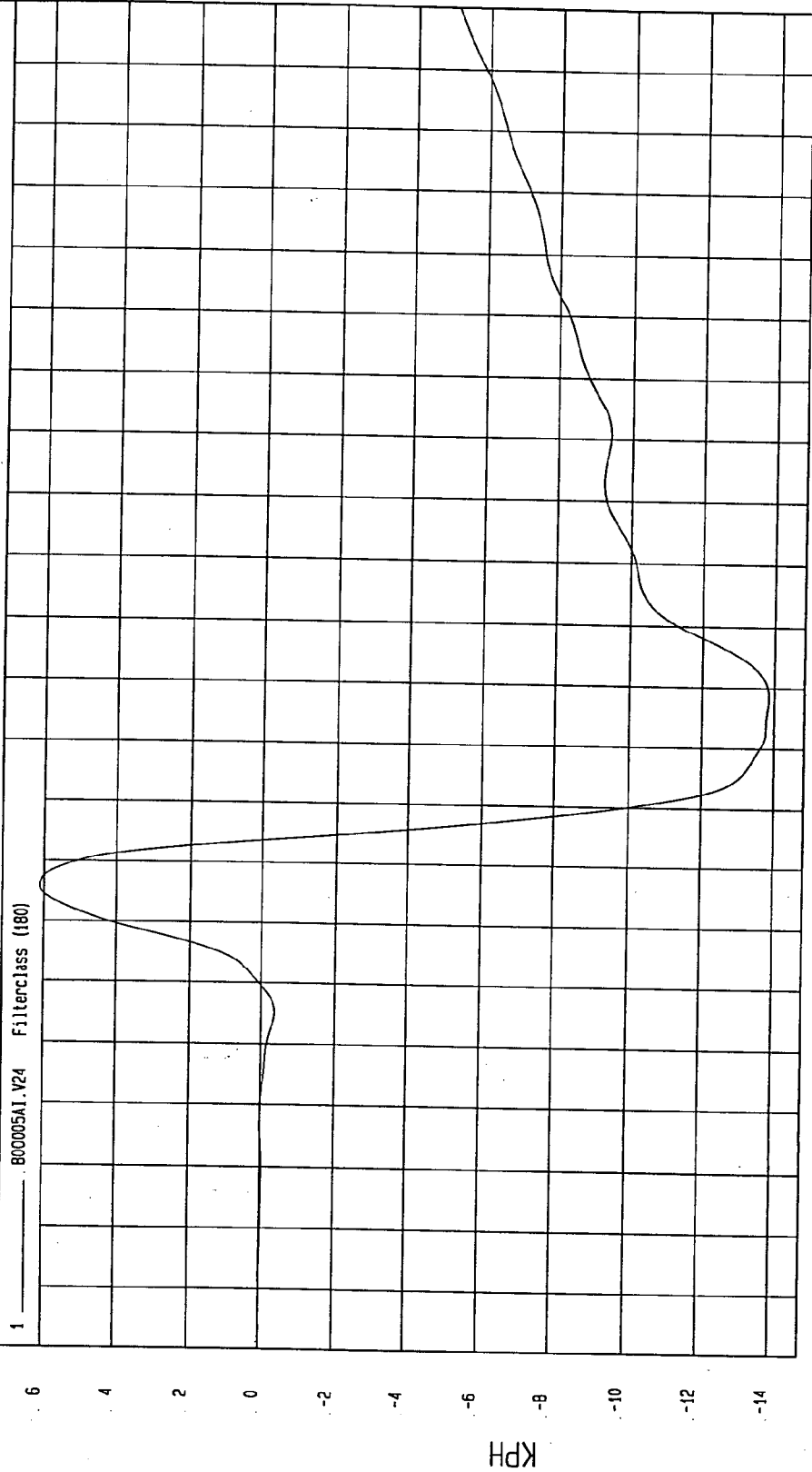
Speed: 38.5 MPH 62 KPH

Minimum = -13.84 KPH at 88 msec

Maximum = 6.12 KPH at 56 msec

REAR PASSENGER HEAD Z VELOCITY

1 800005A1.V24 Filterclass (180)



NGA Research
01-19-2000 14:51

TIME Seconds

KPH

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

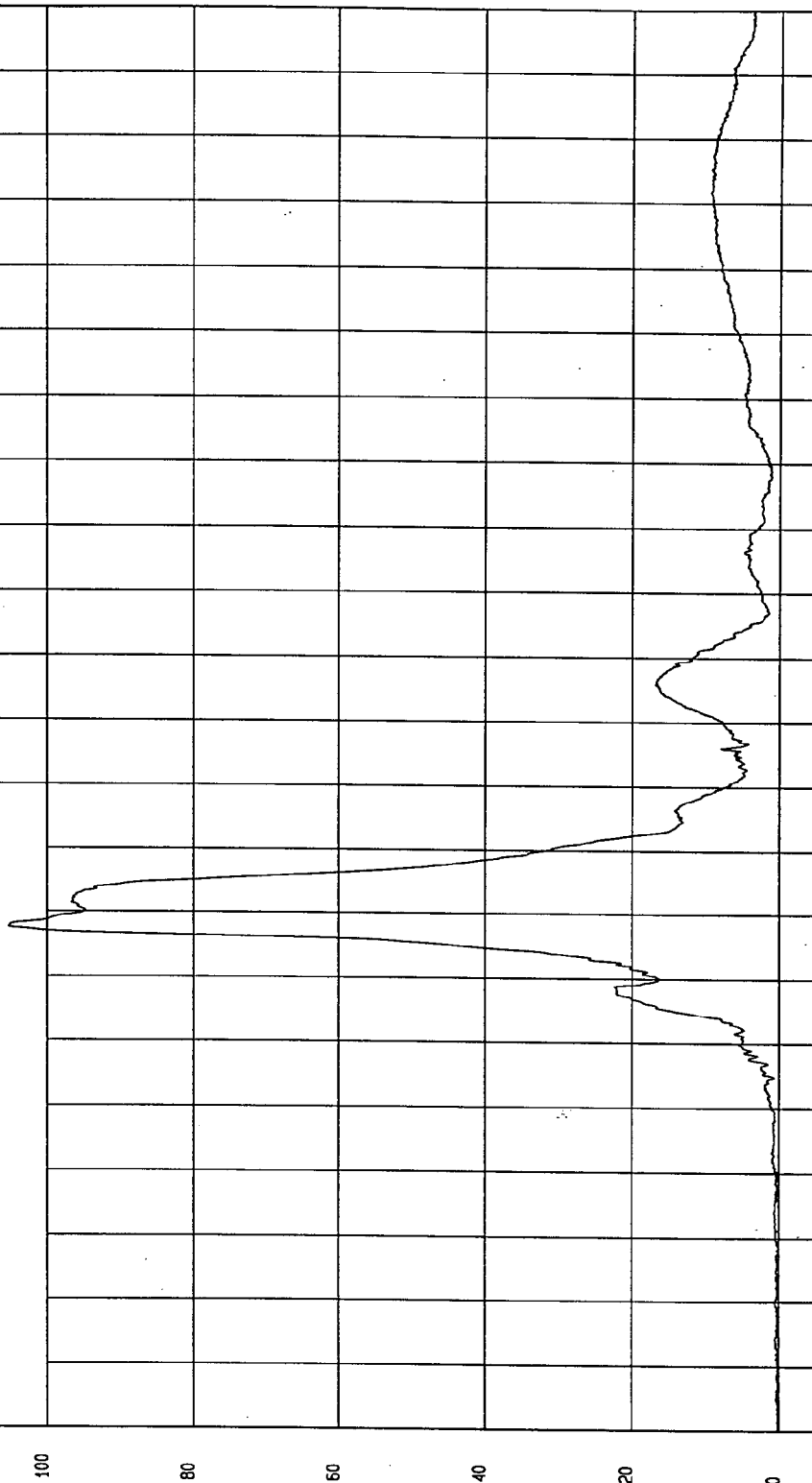
SPEED: 38.5 MPH 62 KPH

Maximum = 105.46 G'S at 58 msec

Minimum = .09 G'S at -20 msec

REAR PASSENGER HEAD RESULTANT

1 800005AV.A22 Filterclass (1000)



MSA Research
01-19-2000 14:51

TIME (SECONDS)

G's

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

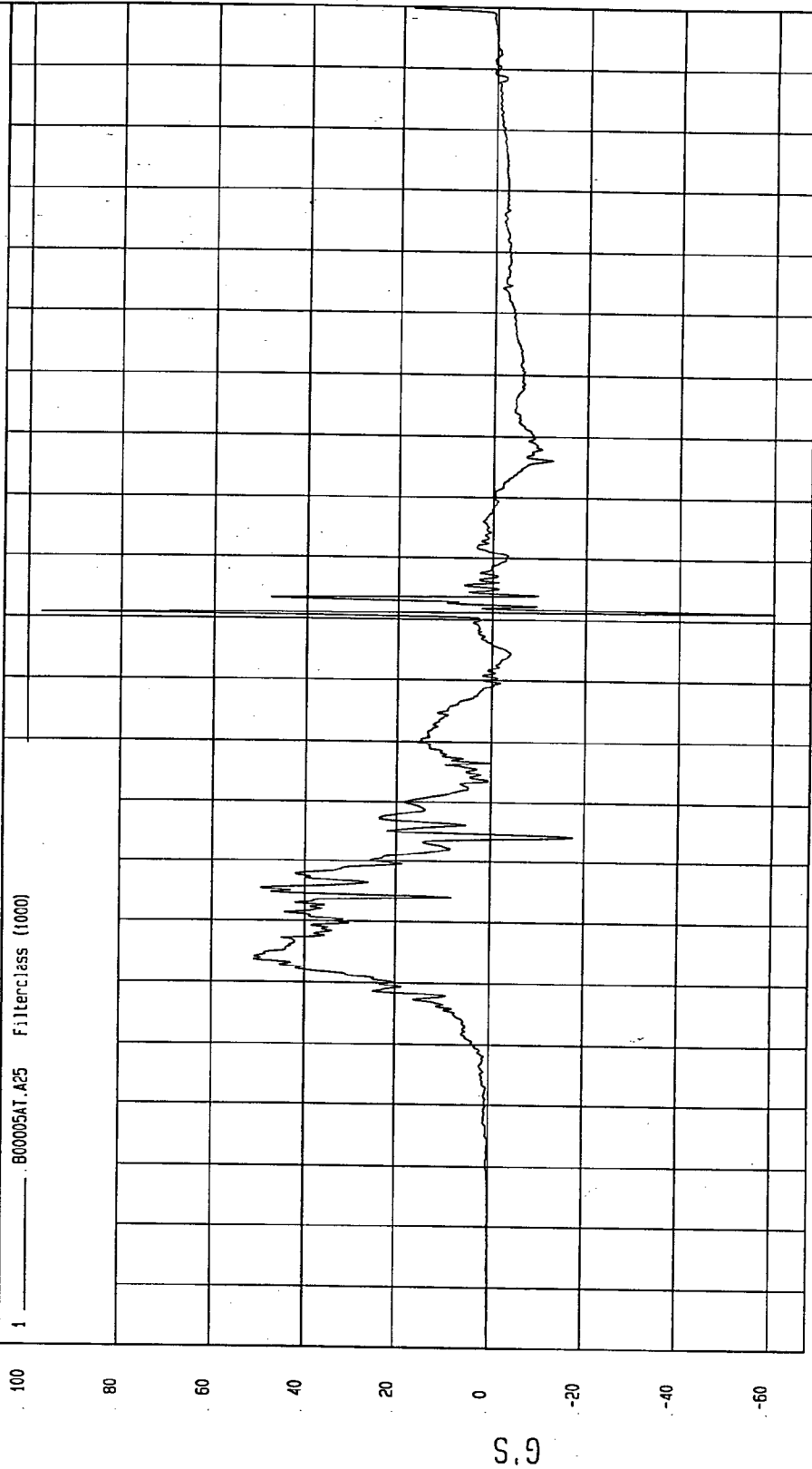
Speed: 38.5 MPH 62 KPH

Minimum = -60.22 G'S at 101 msec

Maximum = 97.22 G'S at 101 msec

REAR PASSENGER UPPER RIB Y ACCELERATION

1 800005AT.A25 Filterclass (1000)



TIME (SECONDS)

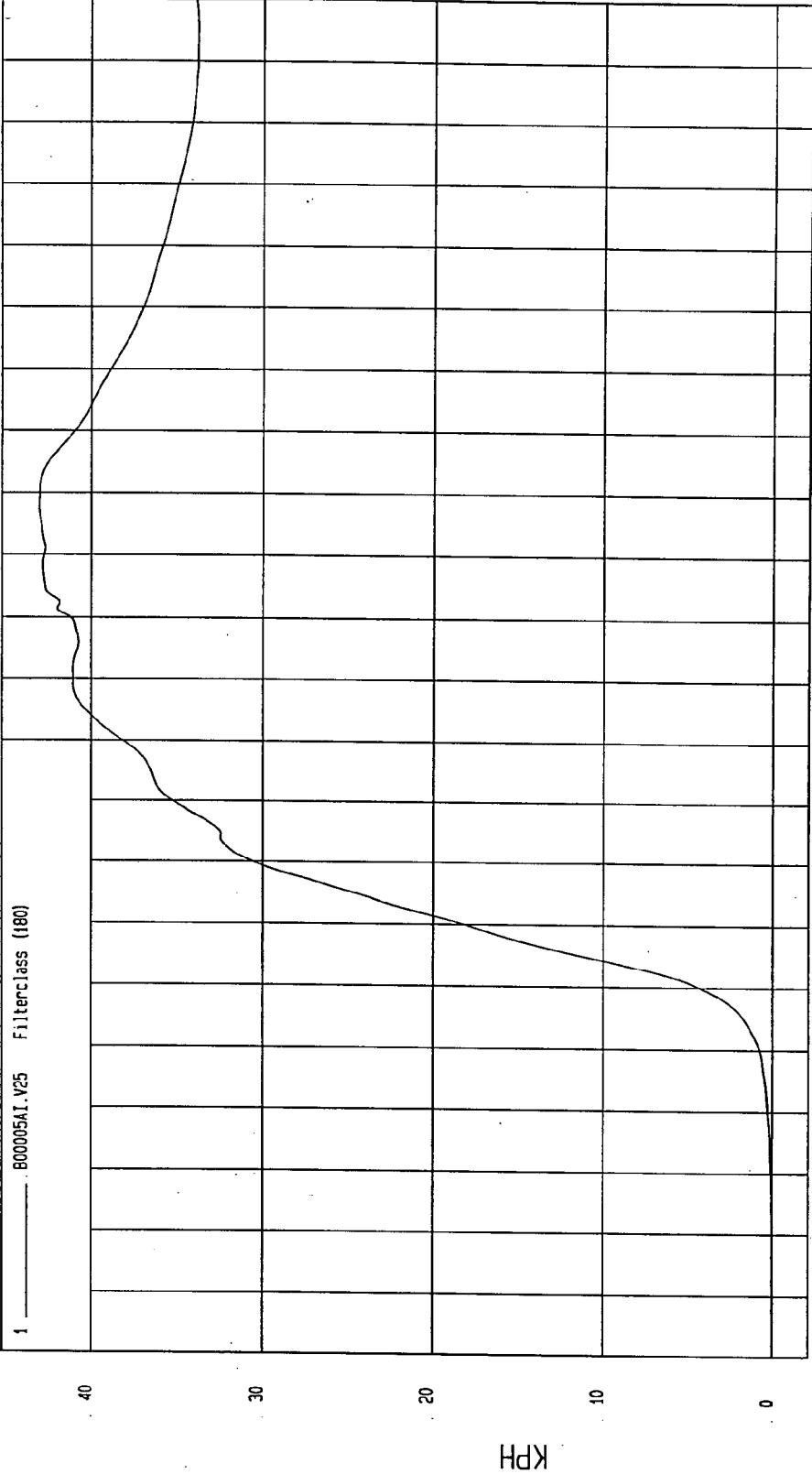
NCA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -2.77E-03 KPH at -8 msec Maximum = 43.07 KPH at 119 msec

REAR PASSENGER UPPER RIB Y VELOCITY



MOA Research
01-19-2000 14:50

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

Minimum = -91.95 G'S at 101 msec

Maximum = 103.12 G'S at 101 msec

REAR PASSENGER LOWER RIB Y ACCELERATION

1 800005AT.A25 FilterClass (1000)

100
80
60
40
20
0
-20
-40
-60
-80
-100

G's

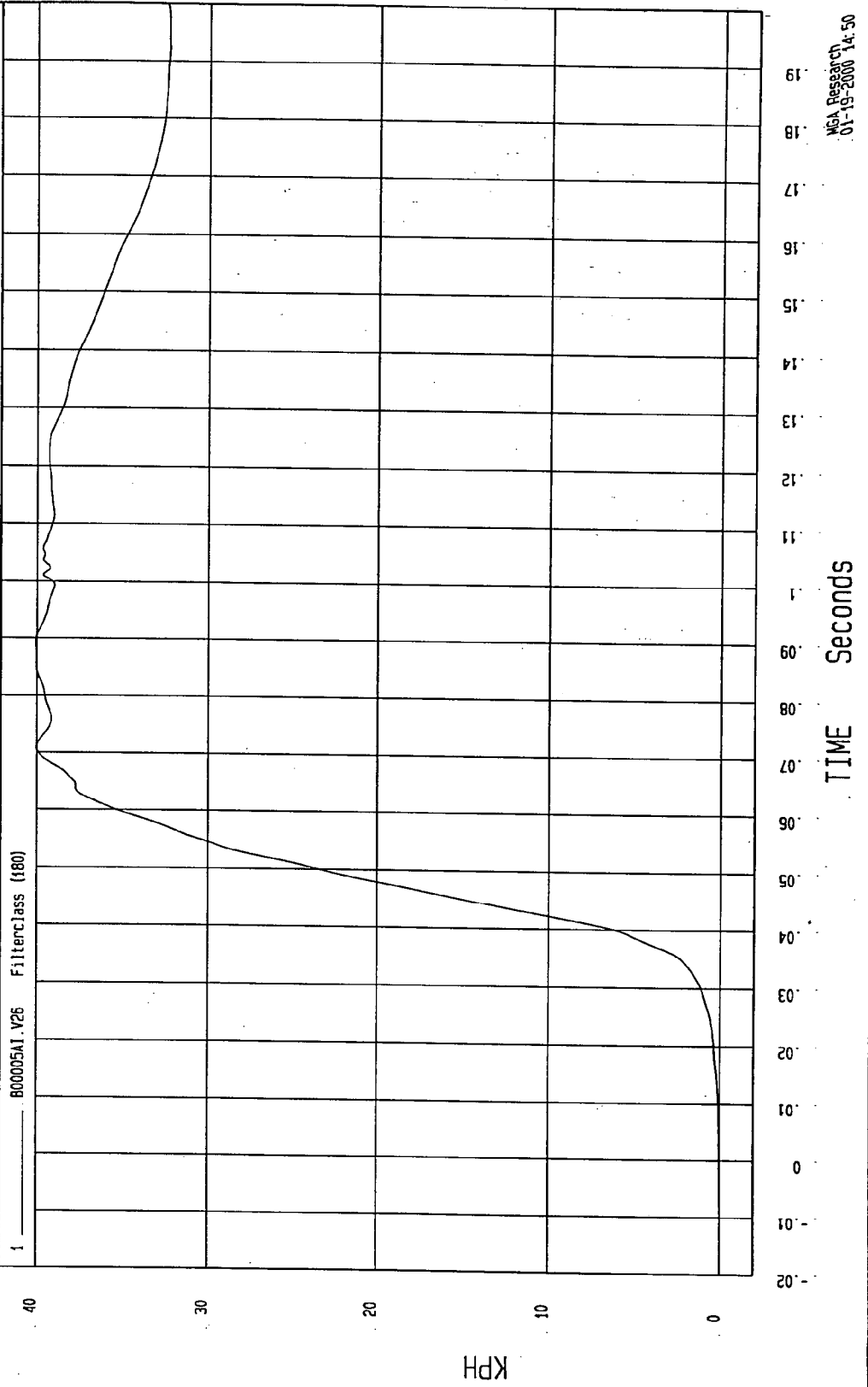
-0.02 -0.01 0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19

TIME (SECONDS)

MCA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH
Minimum = -2.58E-03 KPH at -12 msec Maximum = 40.08 KPH at 90 msec

REAR PASSENGER LOWER RIB Y VELOCITY



TEST: FMVSS 214 INDICANT

COMPONENT: 2000 TOYOTA AVALON (CY5102)

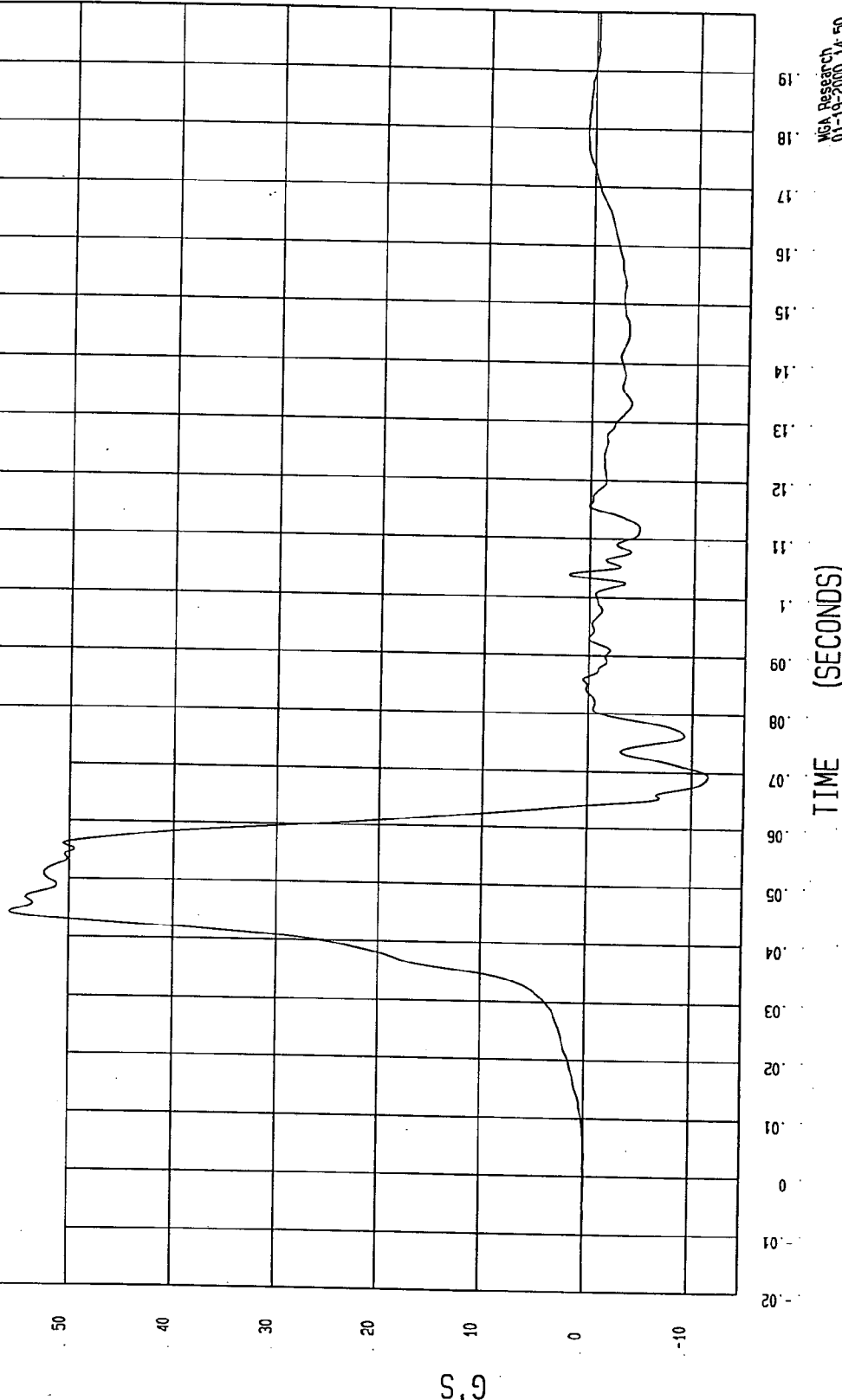
Speed: 38.5 MPH 62 KPH

Minimum = -11.57 G'S at 69 msec

Maximum = 55.72 G'S at 44 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 ——— B00005AF.A27 Filterclass (180)



MGA Research
01-19-2000 14:50

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

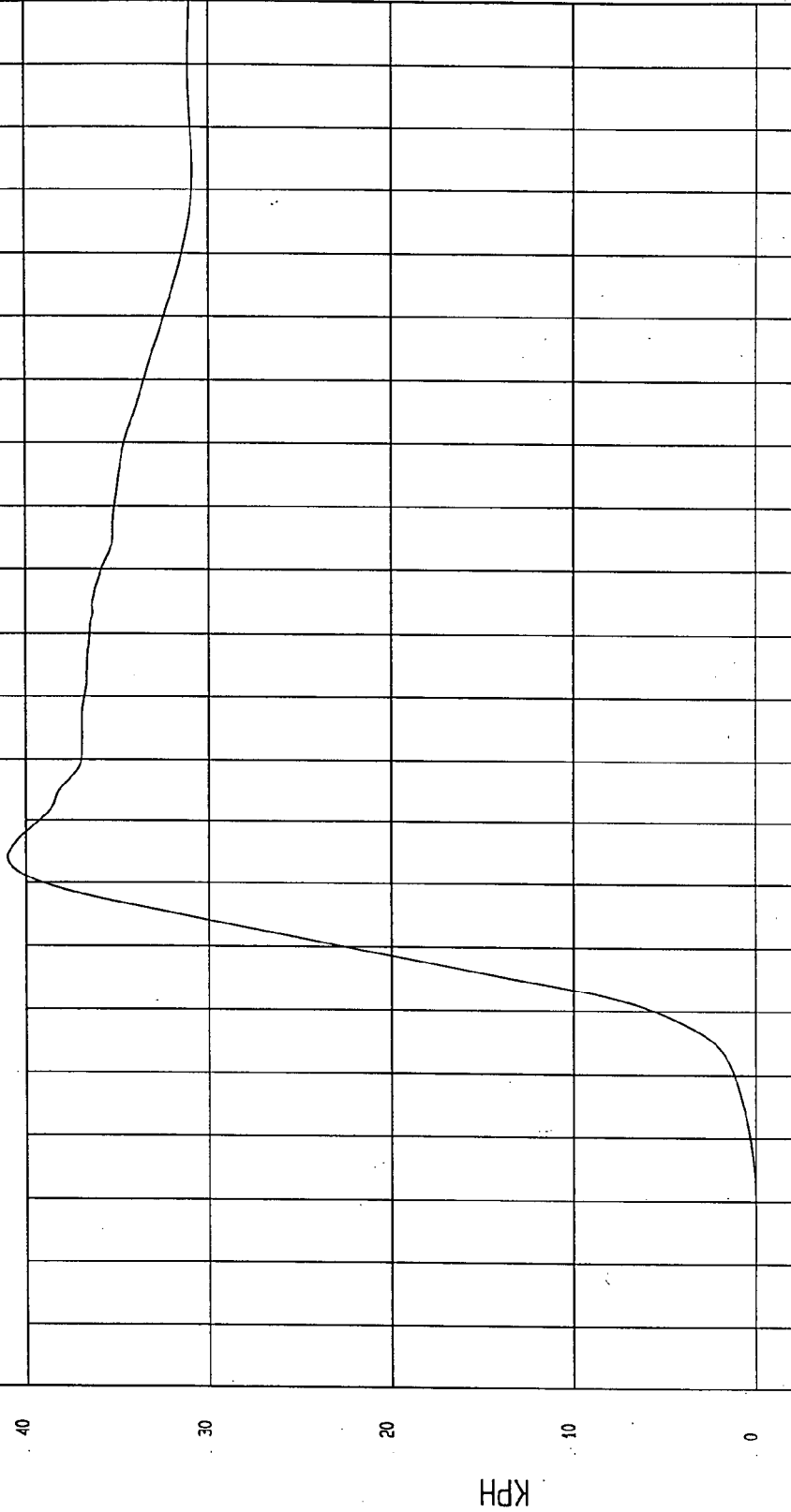
Speed: 38.5 MPH 62 KPH

Minimum = -2.10E-02 KPH at 6 msec

Maximum = 40.99 KPH at 64 msec

REAR PASSENGER LOWER SPINE Y VELOCITY

1 B00005A1.V27 Filterclass (180)



MCA Research
01-19-2000 14: 51

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

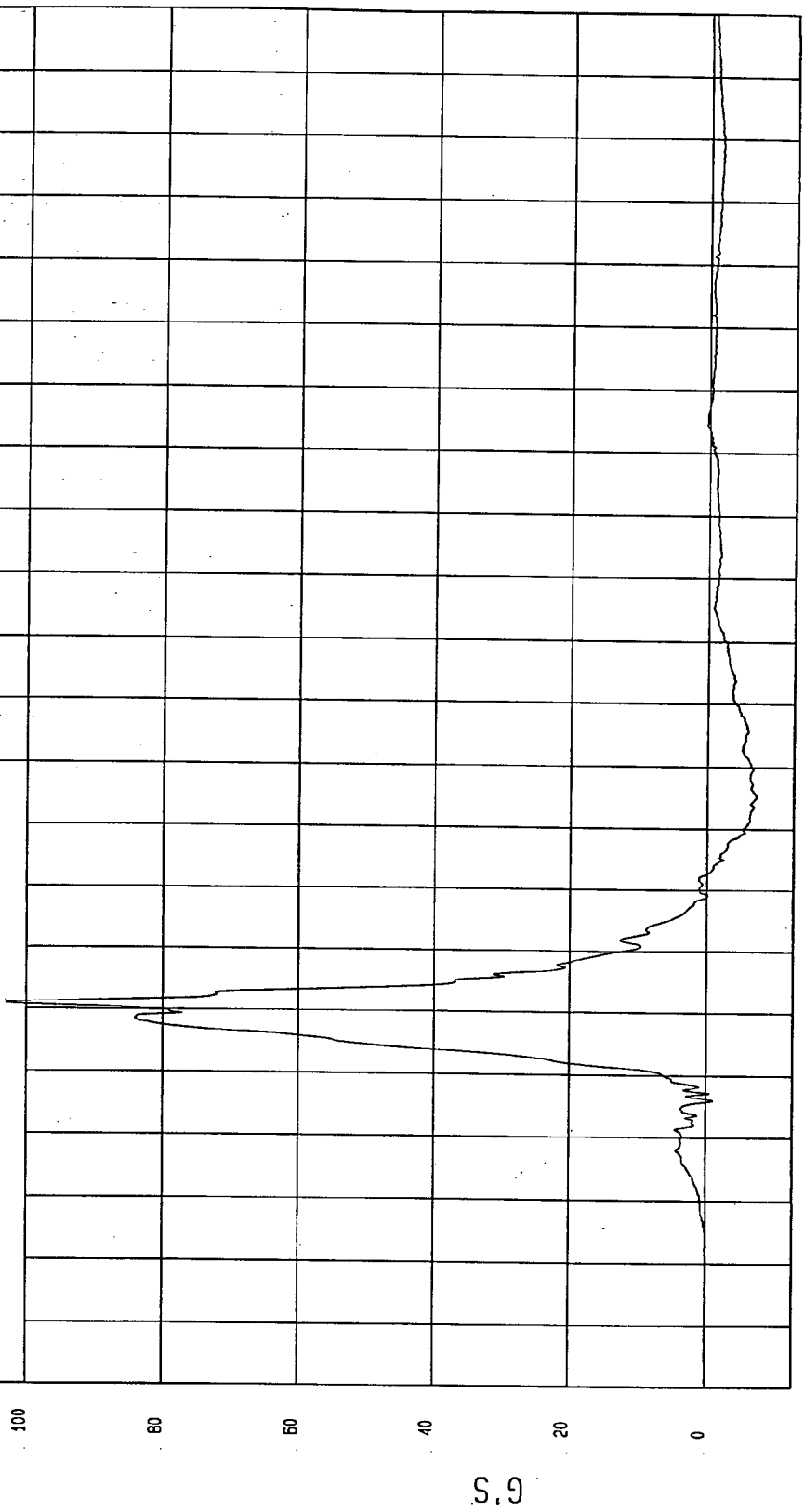
Speed: 38.5 MPH 62 KPH

Minimum = -7.13 G'S at 75 msec

Maximum = 102.9 G'S at 41 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 ——— B00005AT.A28 Filterclass (1000)



NCA Research
01-19-2000 14:51

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

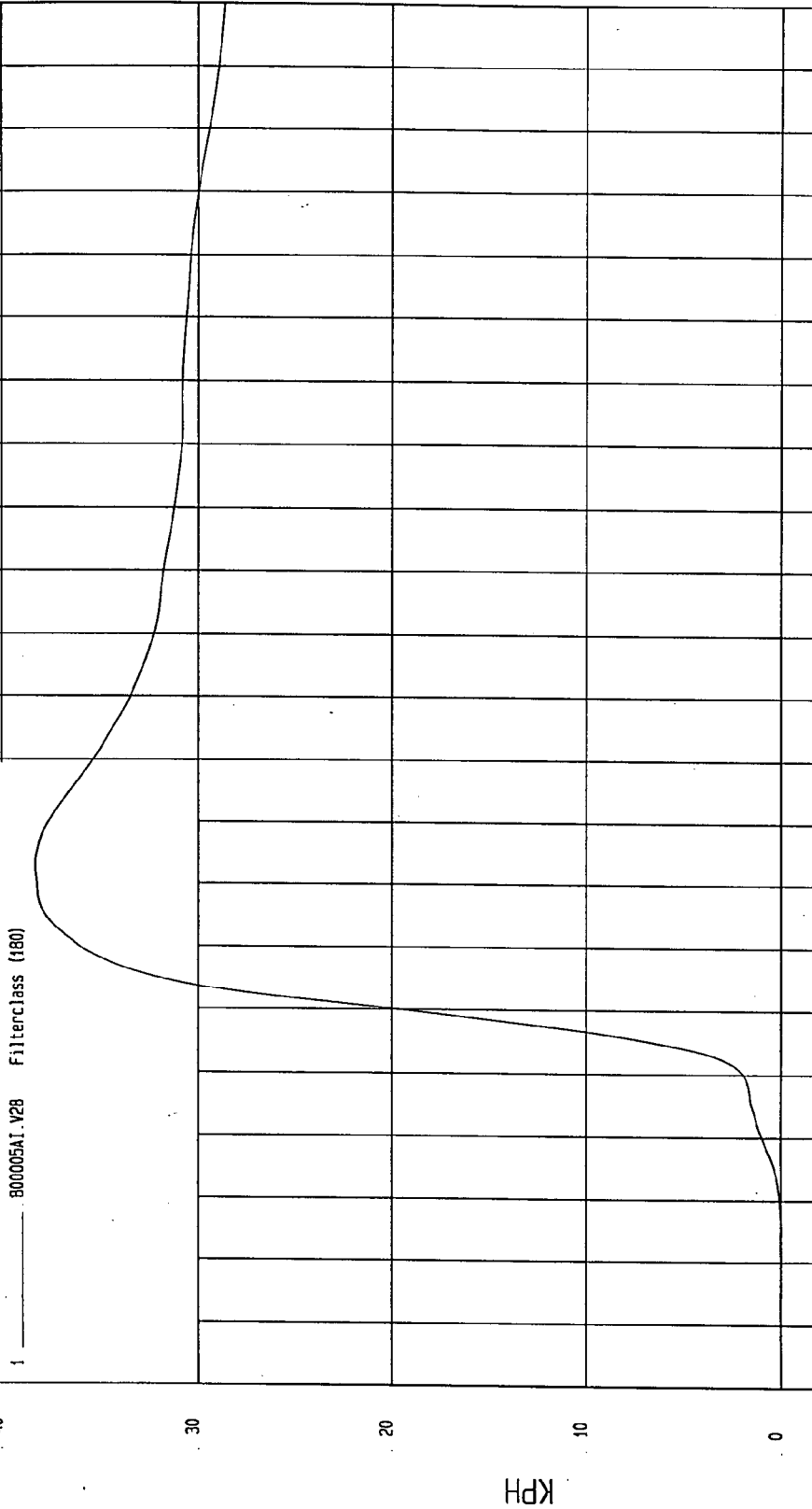
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -.01 KPH at 1 msec

Maximum = 38.29 KPH at 63 msec

REAR PASSENGER PELVIS Y VELOCITY



NGA Research
01-19-2000 14:51

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

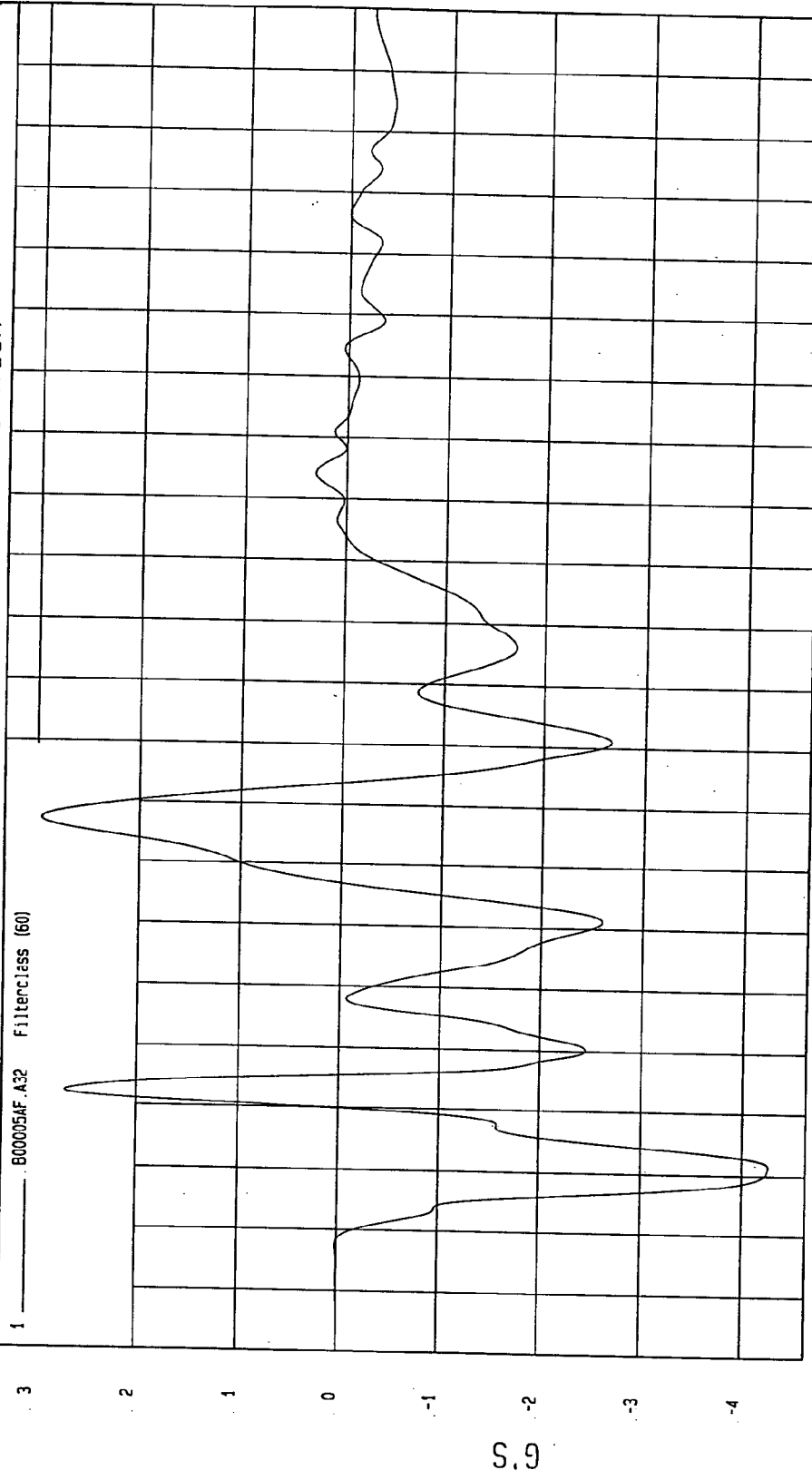
Speed: 38.5 MPH 62 KPH

Minimum = -4.26 G'S at 11 msec

Maximum = 2.96 G'S at 67 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 ——— B00005AF.A32 Filterclass (60)



TIME (SECONDS)

WSA Research
01-19-2000 14:47

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

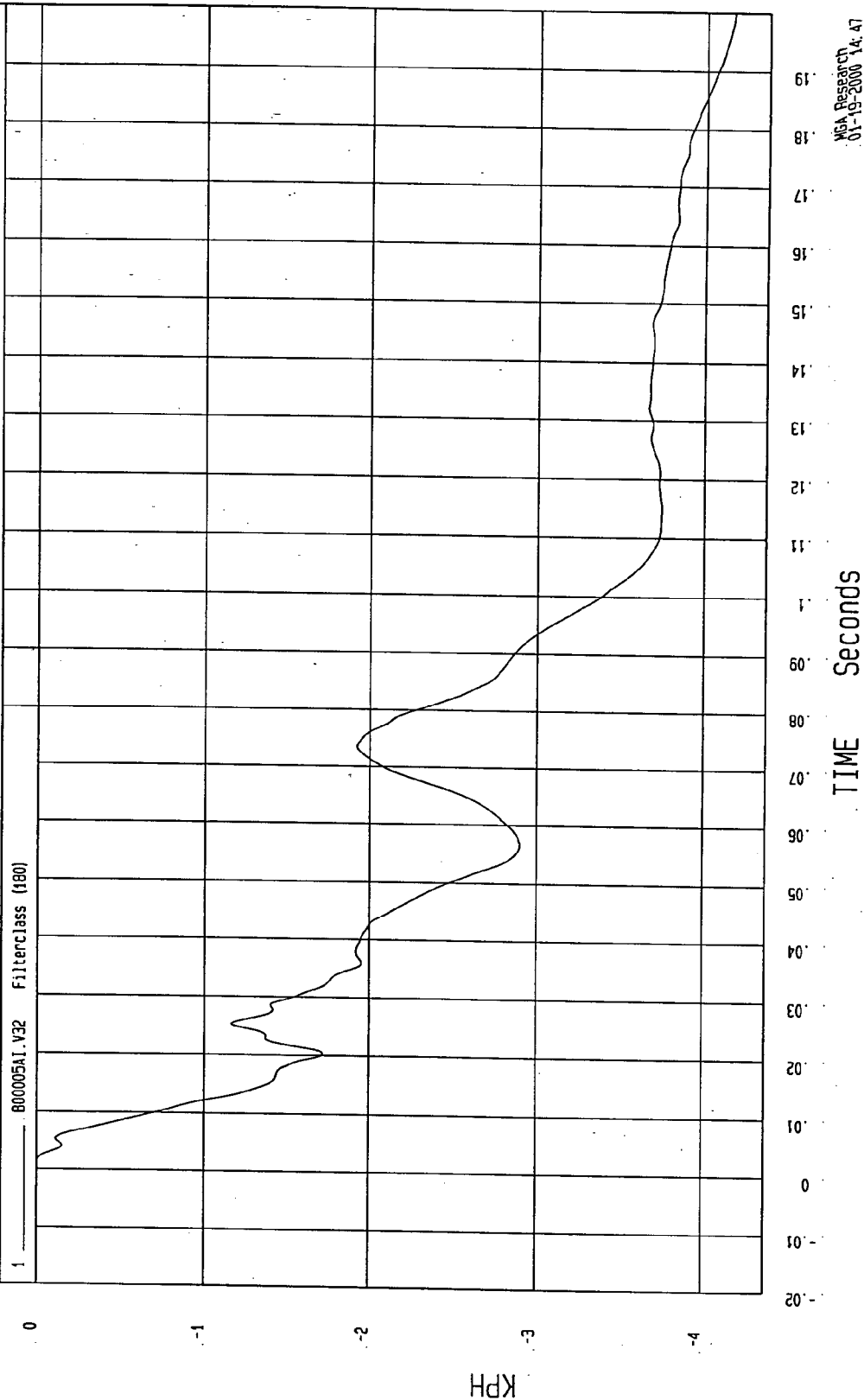
Speed: 38.5 MPH 62 KPH

Minimum = -4.16 KPH at 200 msec

Maximum = 2.21E-03 KPH at -6 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY

1 800005A1.V32 FilterClass (180)

WSA Research
01-19-2000 14:47

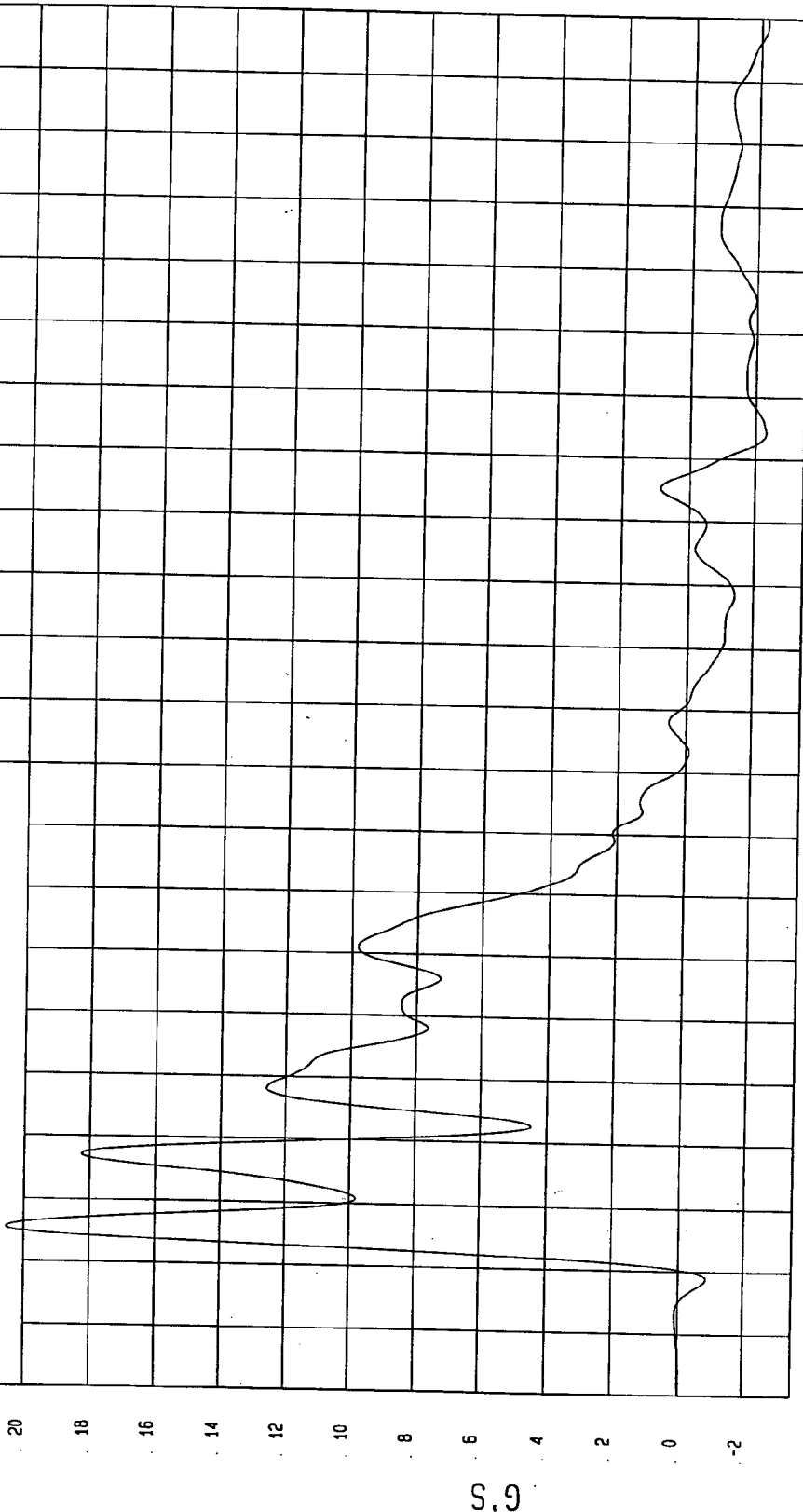
TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -2.32 G'S at 134 msec Maximum = 20.53 G'S at 6 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 800005AF.A33 Filterclass (60)



MCA Research
01-19-2000 14:47

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

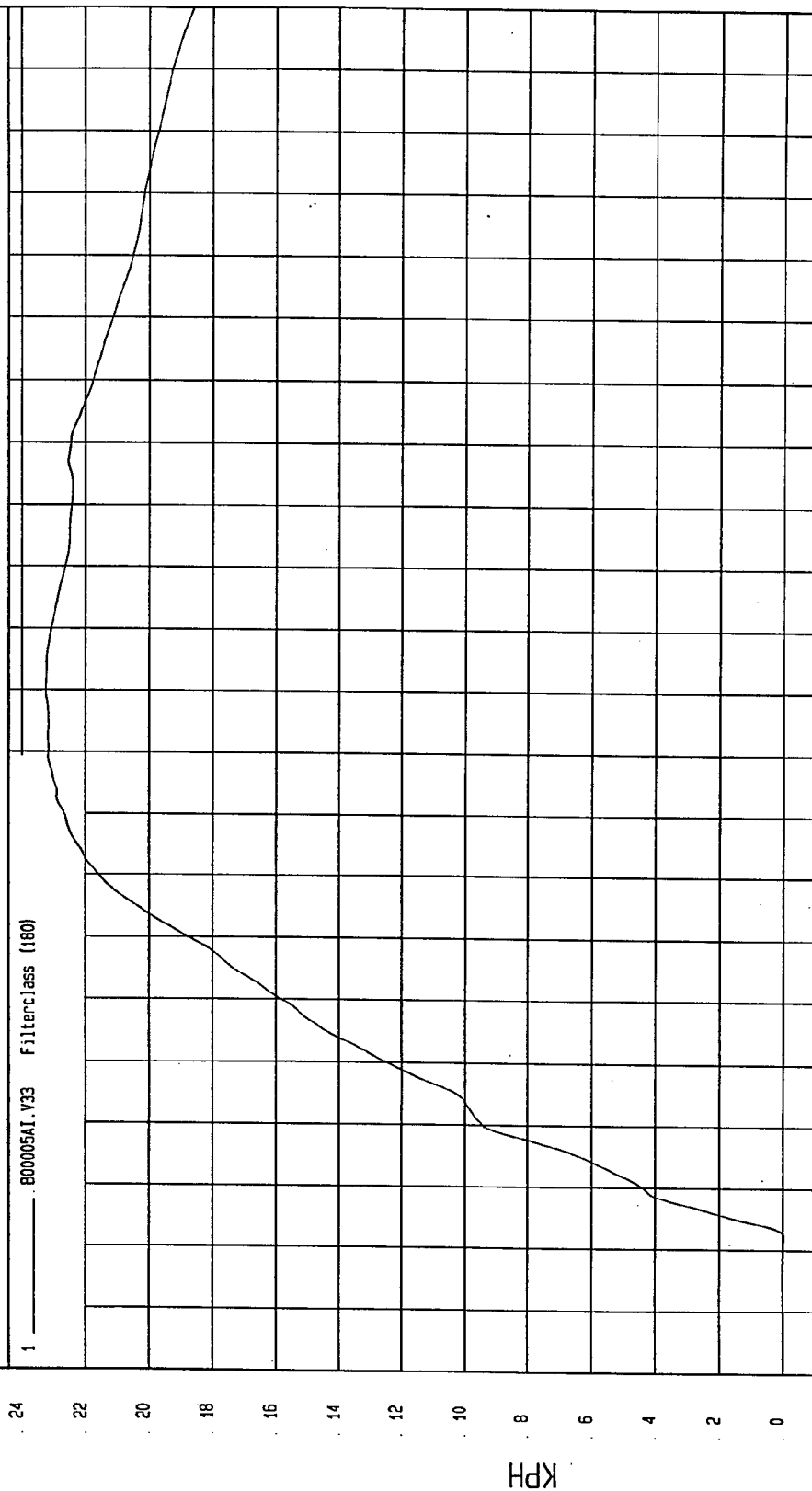
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -3.56E-02 KPH at 2 msec

Maximum = 23.25 KPH at 90 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

1 800005A1.V33 Filterclass (160)

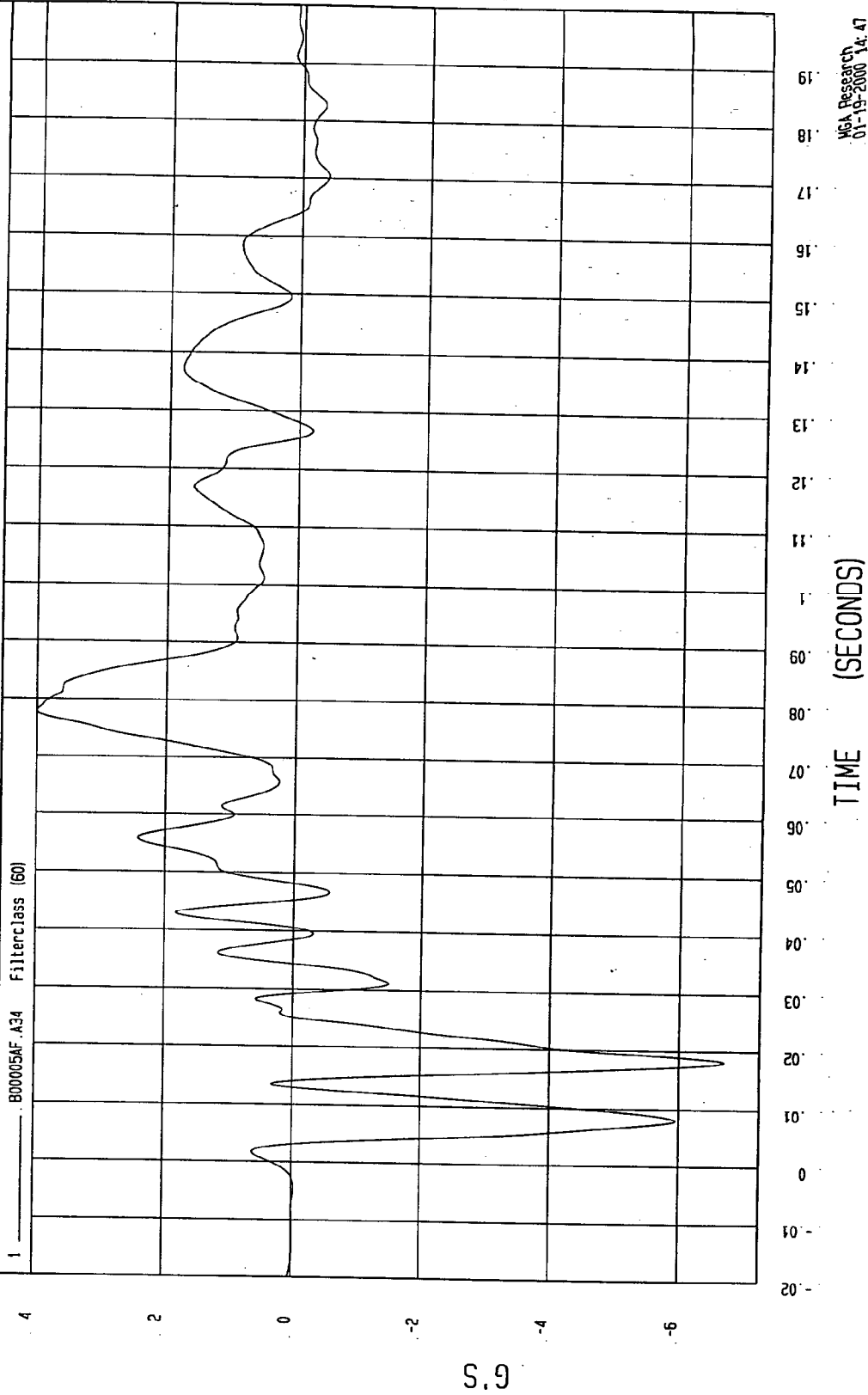


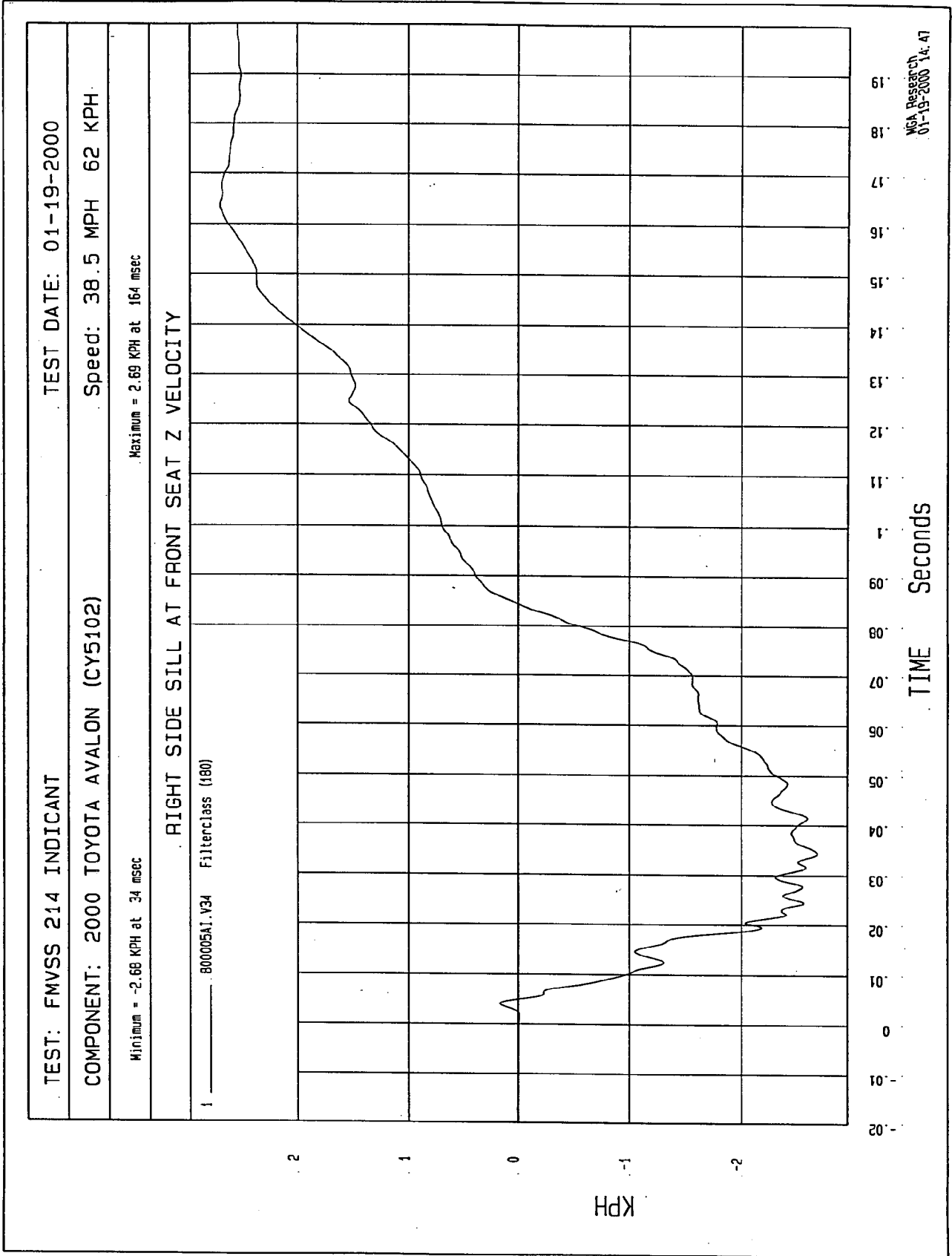
WCA Research
01-19-2000 14: 47

TIME Seconds

TEST: FMVSS 214 INDICANT
 COMPONENT: 2000 TOYOTA AVALON (CY5102)
 Minimum = -6.7 G'S at 18 msec
 Maximum = 4 G'S at 78 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION

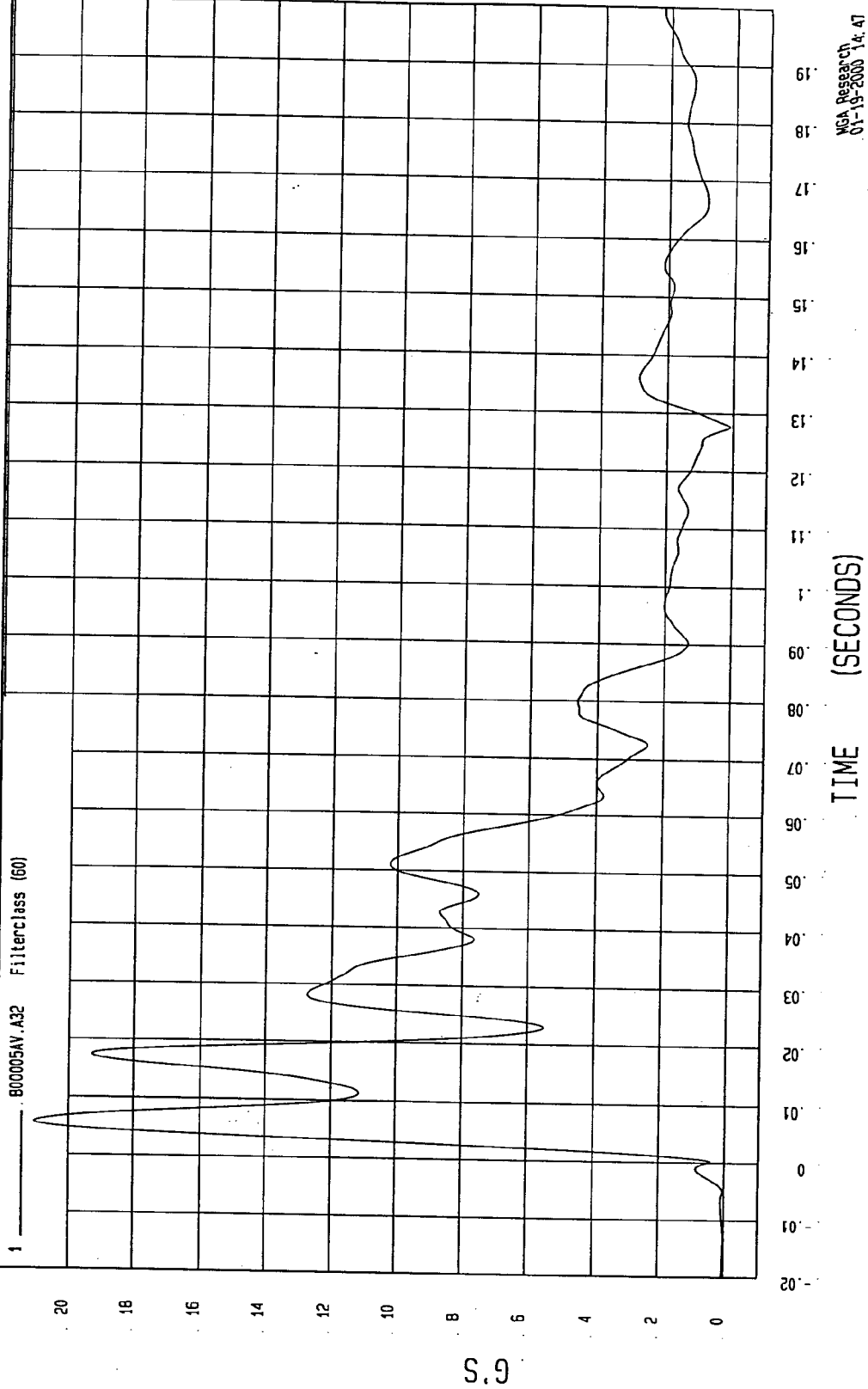


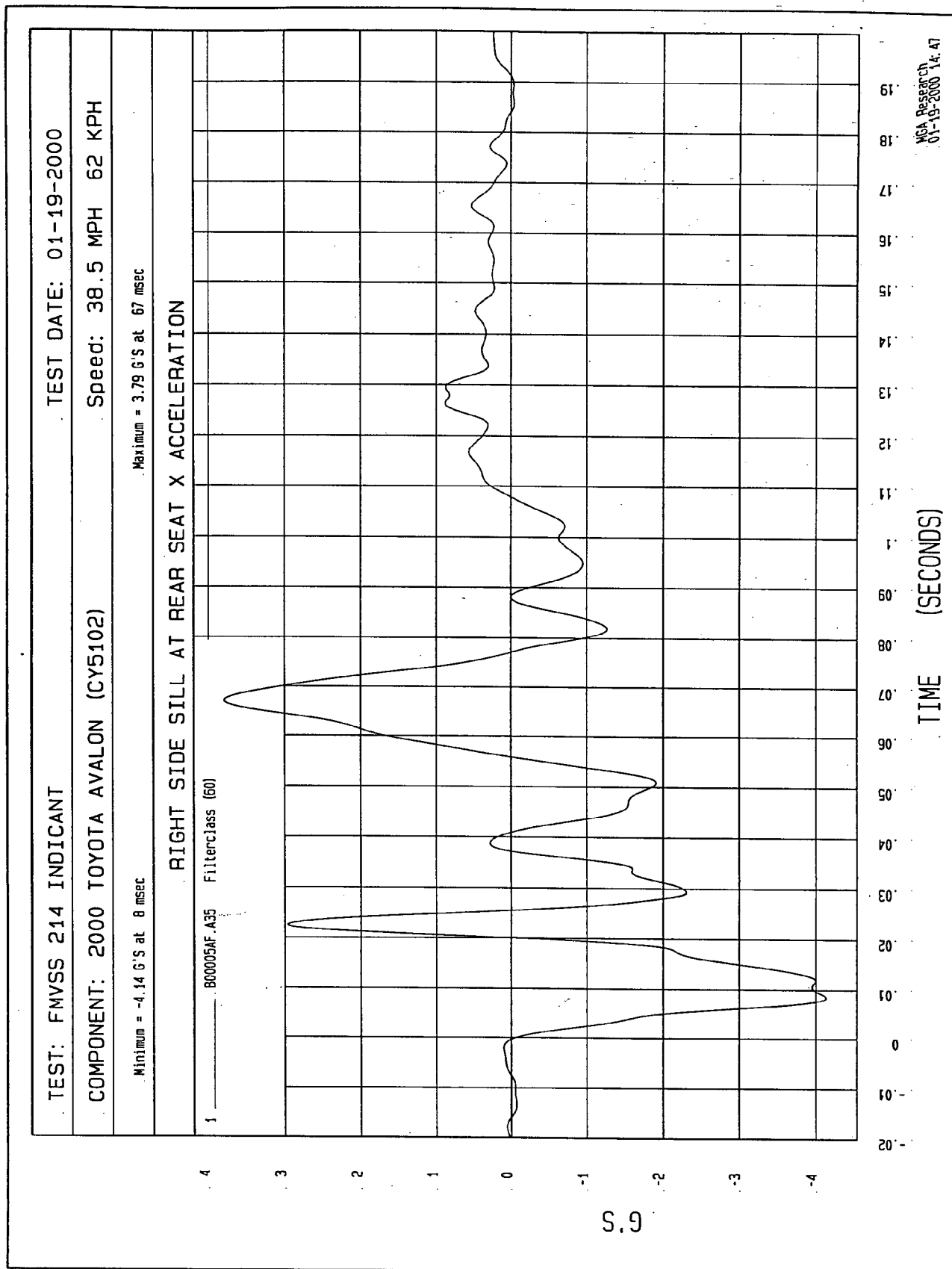


TEST: FMVSS 214 INDICANT
 COMPONENT: 2000 TOYOTA AVALON (CY5102)
 Speed: 38.5 MPH 62 KPH

Minimum = 1.49E-02 G'S at -14 msec
 Maximum = 21.03 G'S at 6 msec

RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



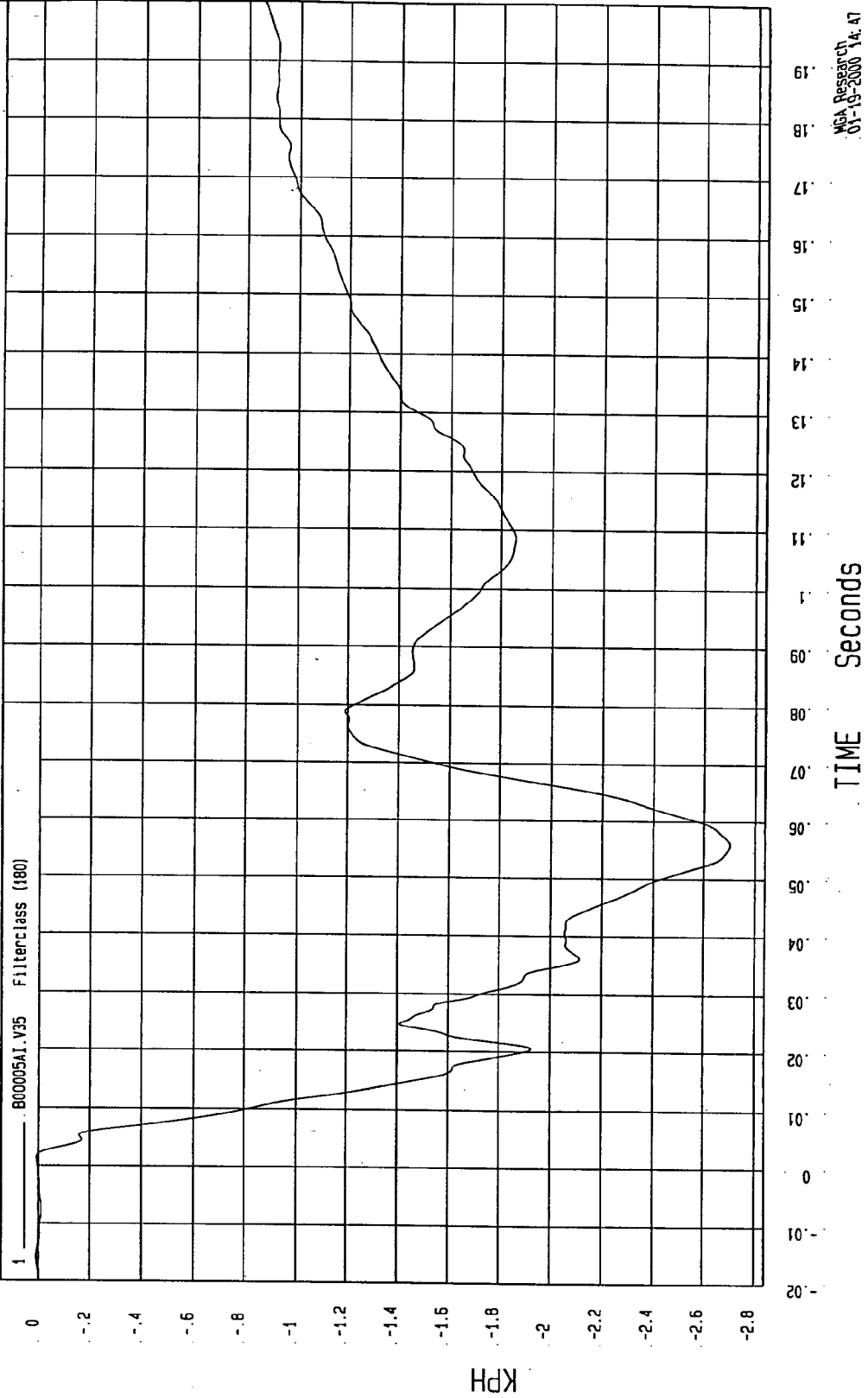


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -2.7 KPH at 56 msec Maximum = 8.77E-03 KPH at -16 msec

RIGHT SIDE SILL AT REAR SEAT X VELOCITY



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

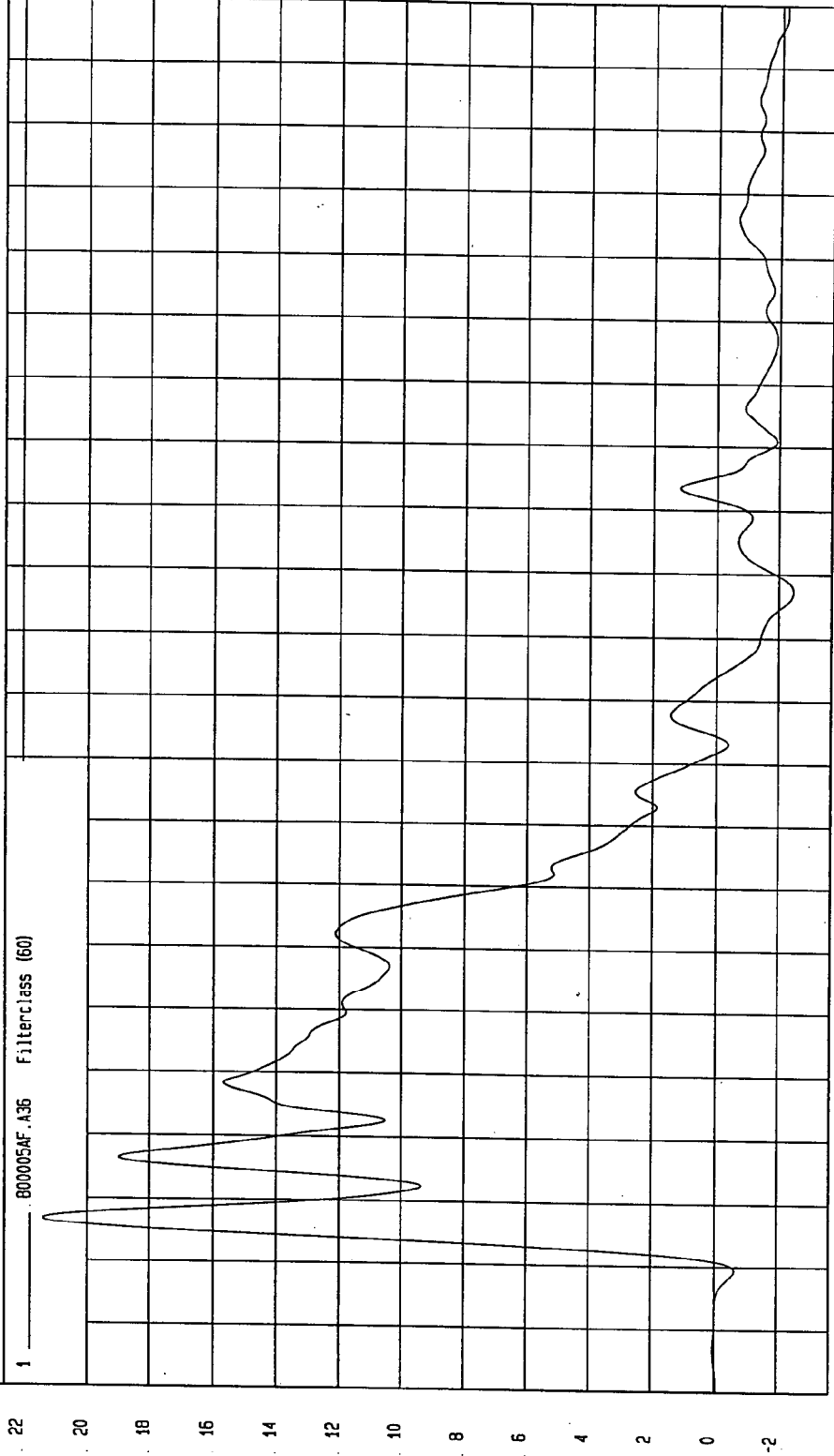
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 21.37 G'S at 7 msec

Minimum = -2.46 G'S at 107 msec

RIGHT SIDE SILL AT REAR SEAT Y ACCELERATION

1 800005AF.A36 Filterclass (60)



MGA Research
01-19-2000 15:00

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

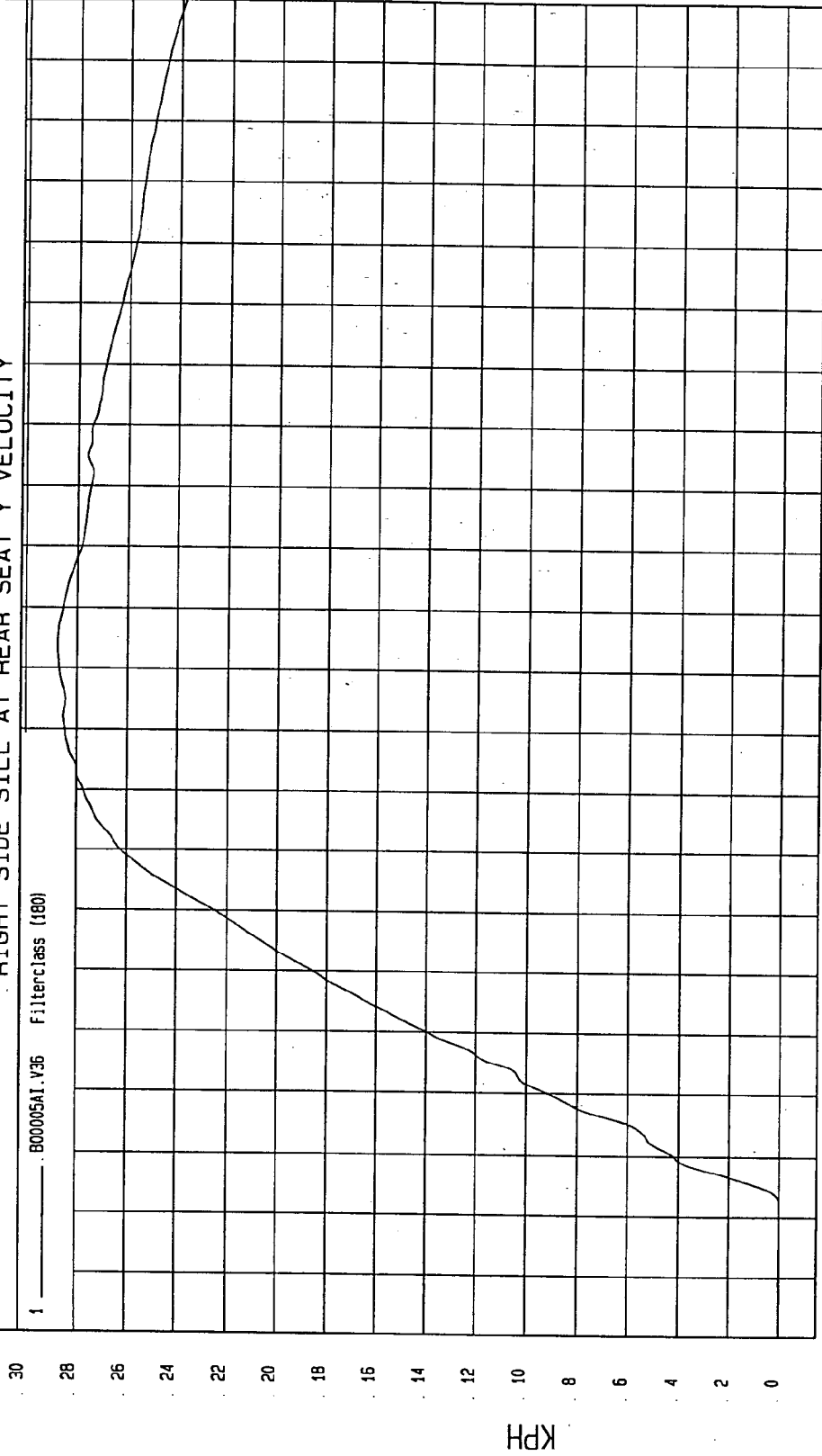
Speed: 38.5 MPH 62 KPH

Minimum = -4.90E-03 KPH at 2 msec

Maximum = 28.76 KPH at 94 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY

1 ——— .B00005A1.V36 Filterclass (180)



MGA Research
01-19-2000 15:03

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

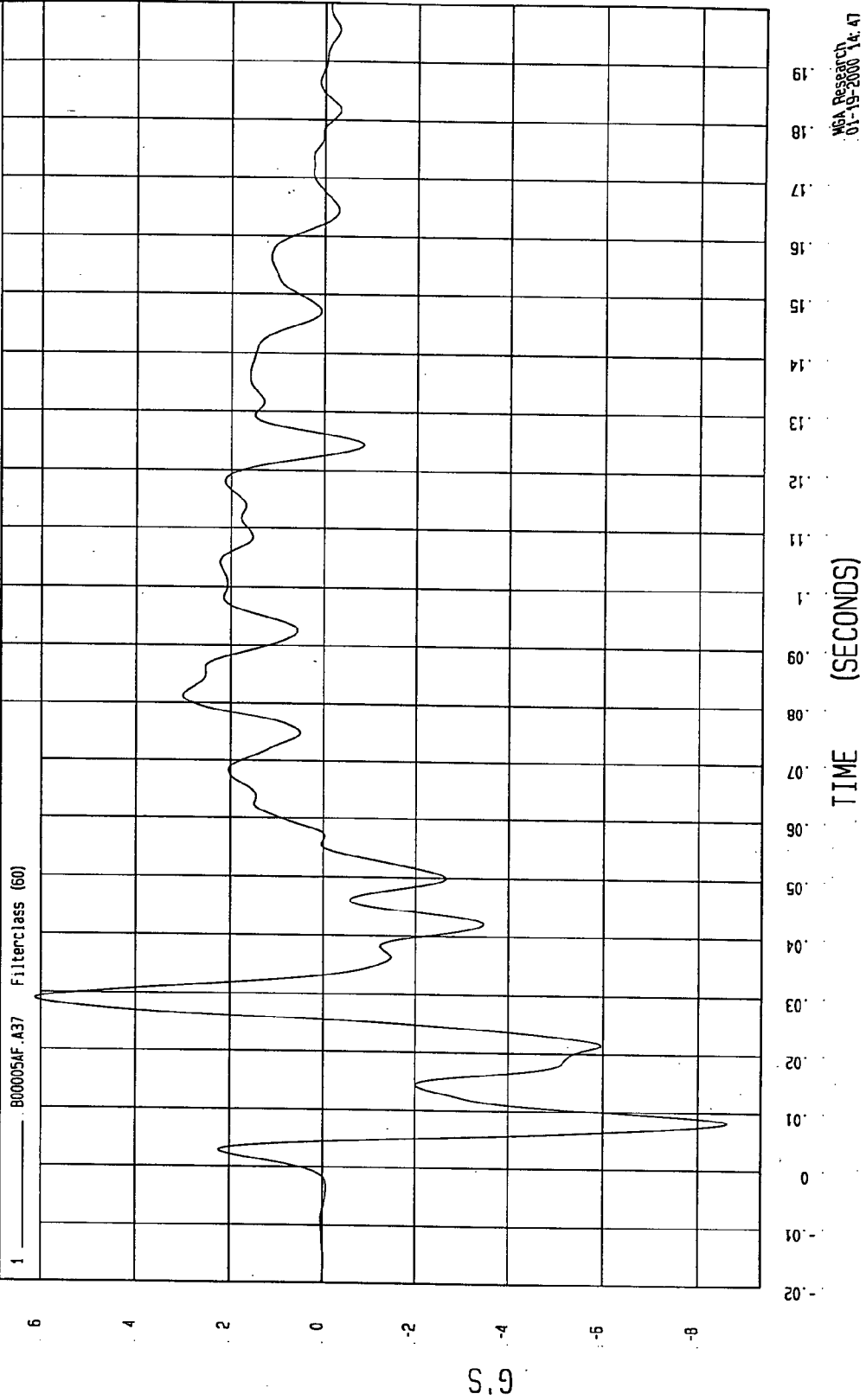
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -8.63 G'S at 8 msec

Maximum = 6.12 G'S at 29 msec

RIGHT SIDE SILL AT REAR SEAT Z ACCELERATION



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

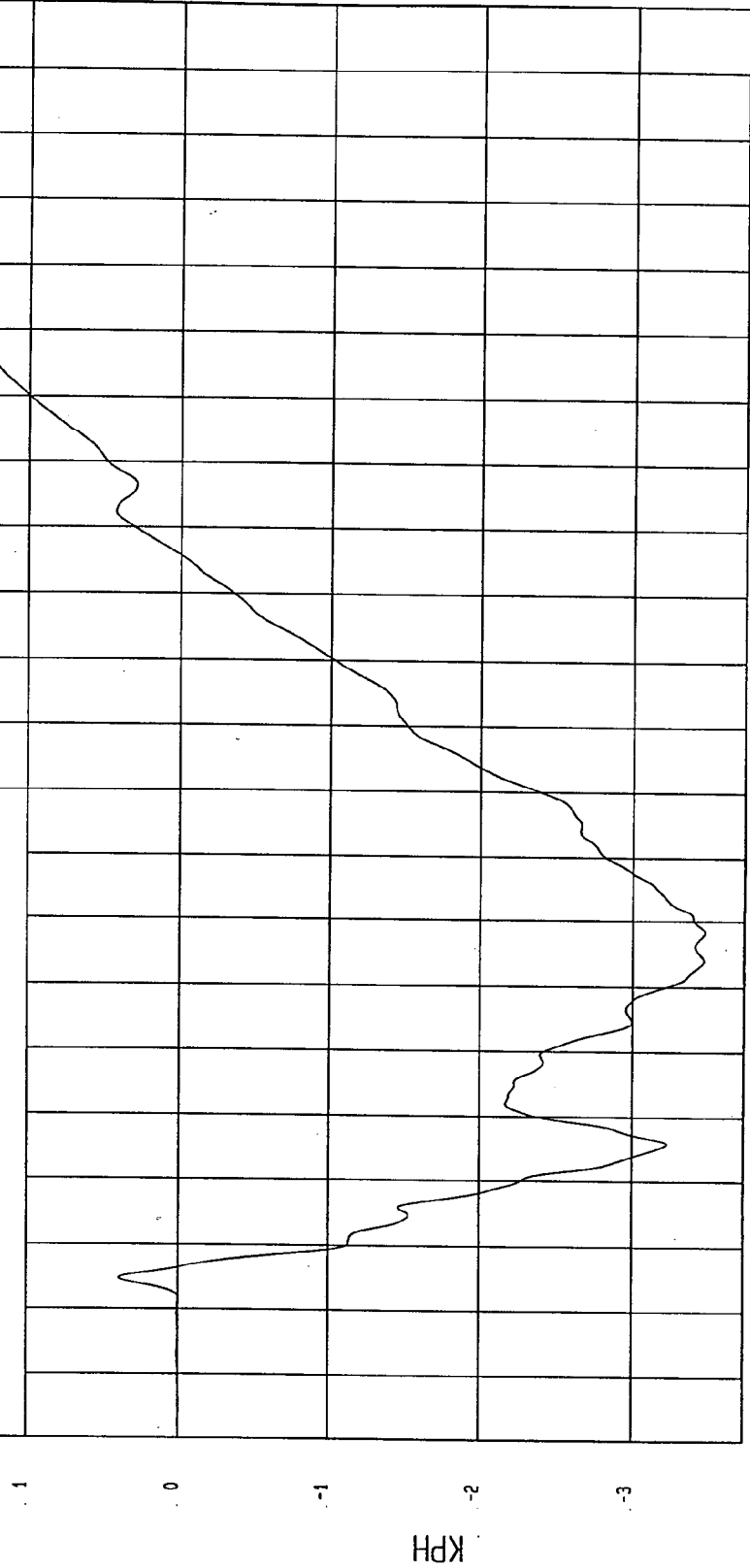
Speed: 38.5 MPH 62 KPH

Minimum = -3.48 KPH at 58 msec

Maximum = 1.66 KPH at 180 msec

RIGHT SIDE SILL AT REAR SEAT Z VELOCITY

1 ——— B00005A1.V37 Filterclass (180)



MCA Research
01-19-2000 14:47

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

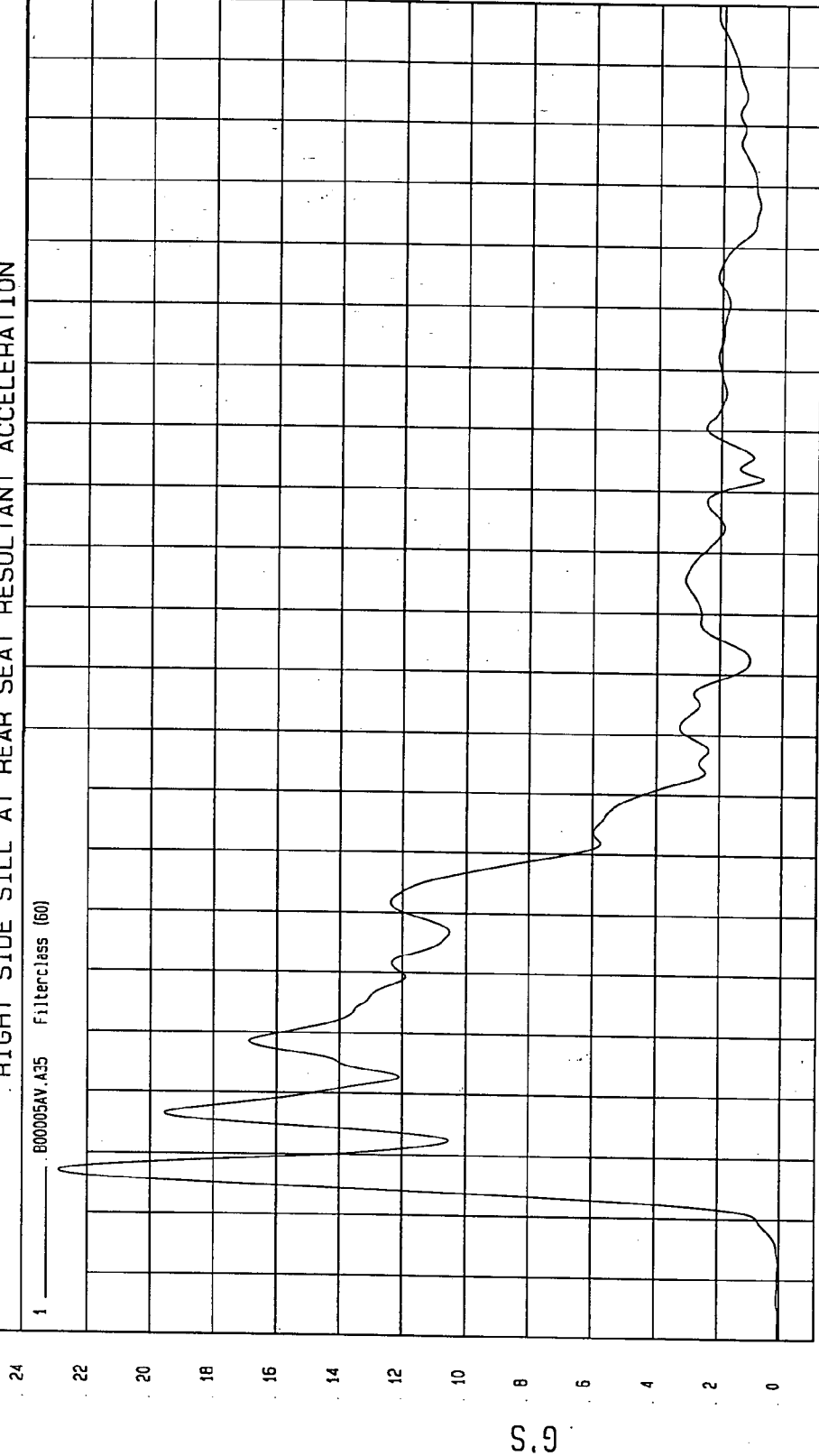
Speed: 38.5 MPH 62 KPH

Minimum = 1.11E-02 G'S at -7 msec

Maximum = 22.9 G'S at 7 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION

1 ——— B00005AV.A35 Filterclass (60)



MCA Research
01-19-2000 14:47

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

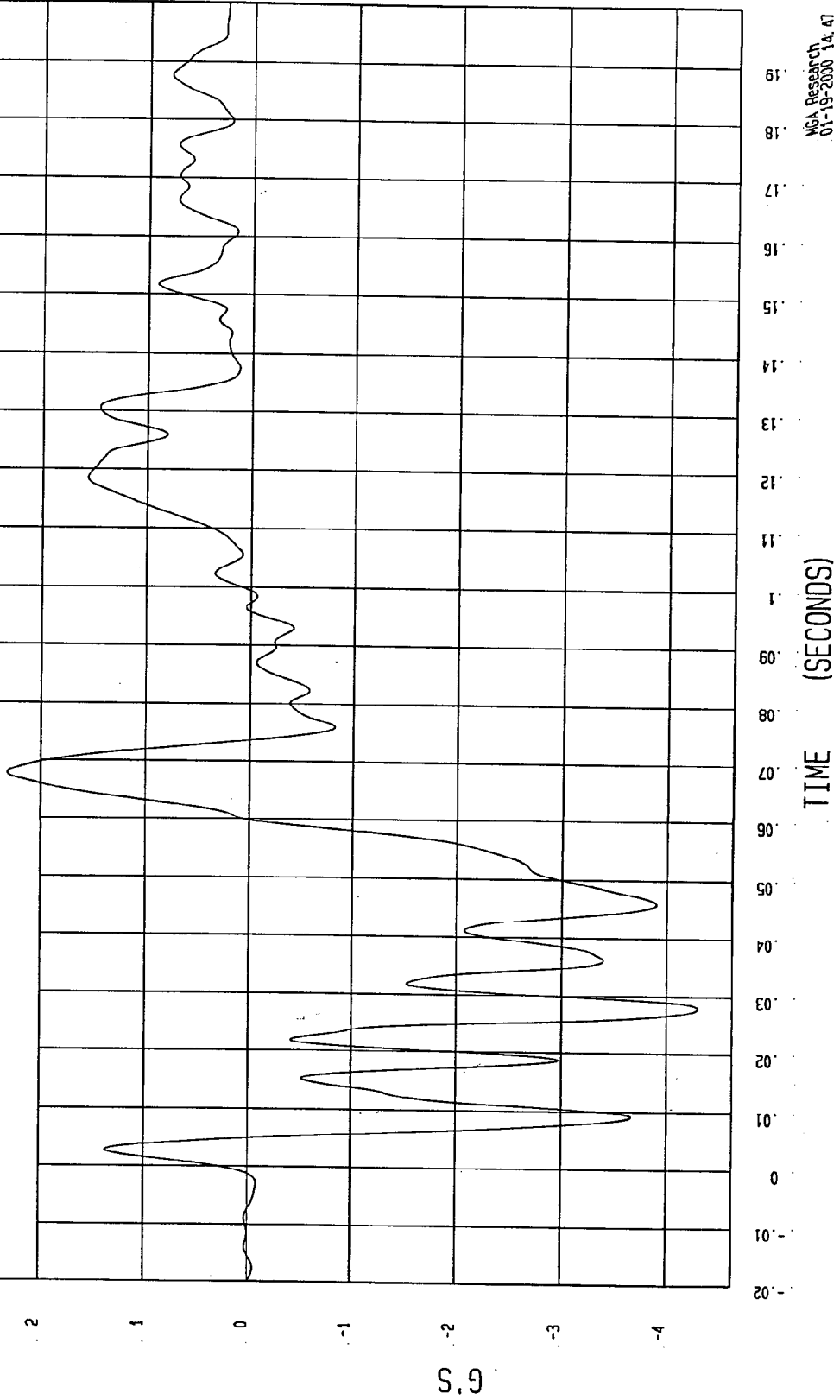
Speed: 38.5 MPH 62 KPH

Minimum = -4.31 G'S at 28 msec

Maximum = 2.32 G'S at 68 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION

1 ——— 800005AF.A08 Filterclass (60)



NGA Research
01-19-2000 14: 47

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

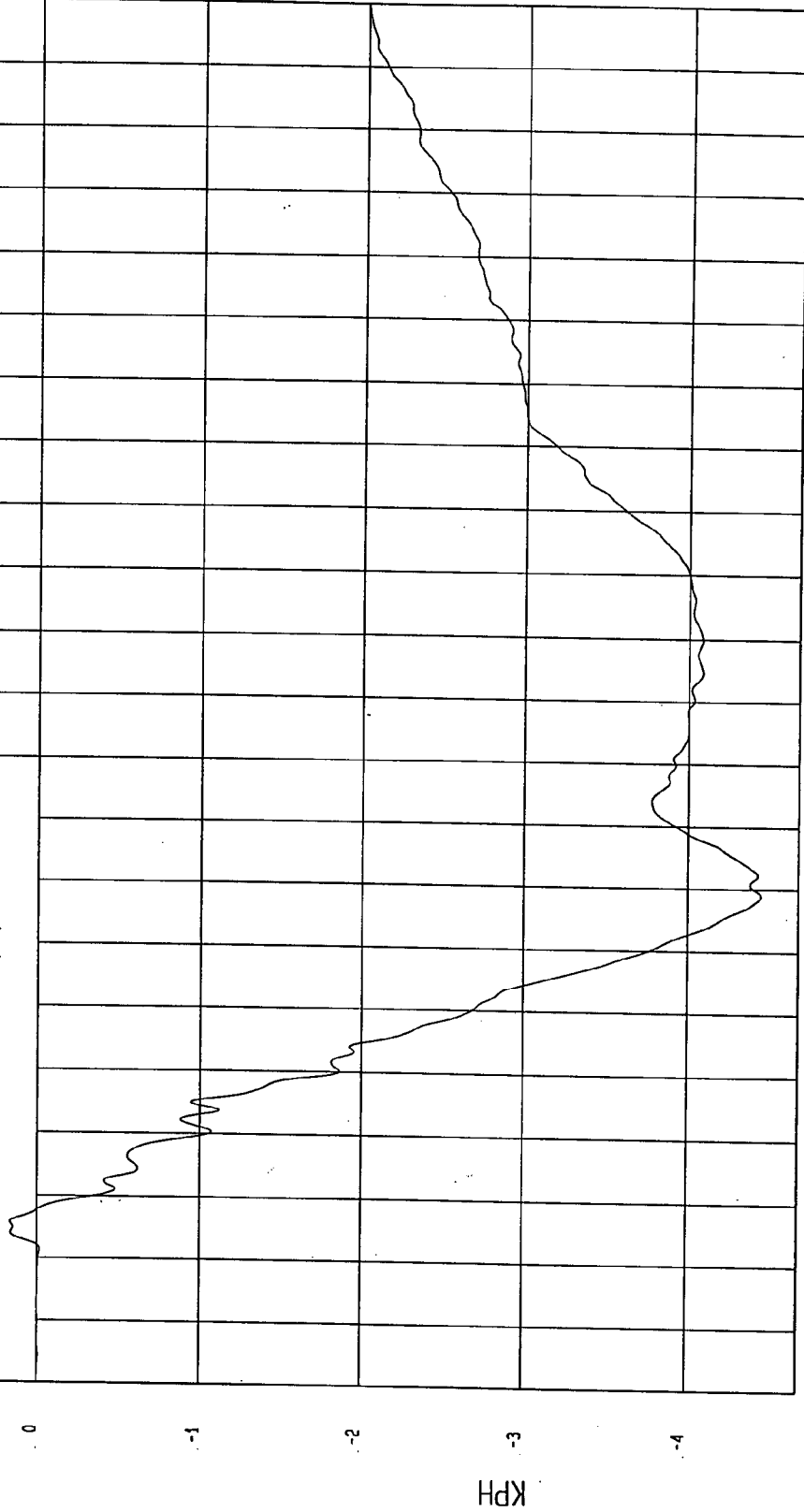
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -4.45 KPH at 59 msec

Maximum = .16 KPH at 6 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY

1 800005AI.V08 Filterclass (180)



WCA Research
01-19-2000 14:47

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

Minimum = -2.4 G'S at 98 msec

Maximum = 19.06 G'S at 8 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION

20

1 800005AF.A09 Filterclass (60)

18

16

14

12

10

8

6

4

2

0

-2

G.S

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

NCA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

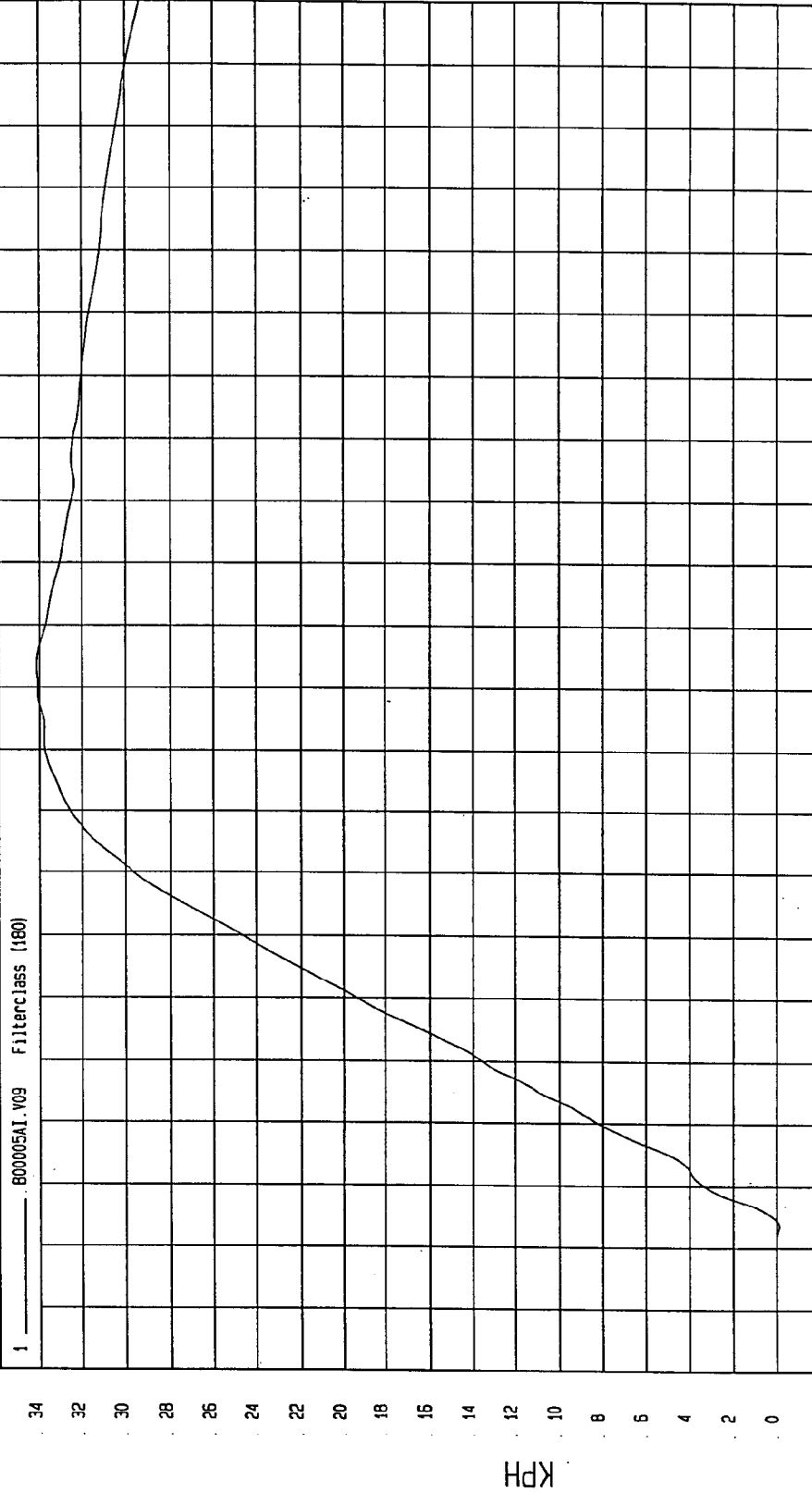
Speed: 38.5 MPH 62 KPH

Minimum = -.12 KPH at 3 msec

Maximum = 34.13 KPH at 93 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY

1 _____ 800005A1.V09 Filterclass (180)



MCA Research
01-19-2000 14:48

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

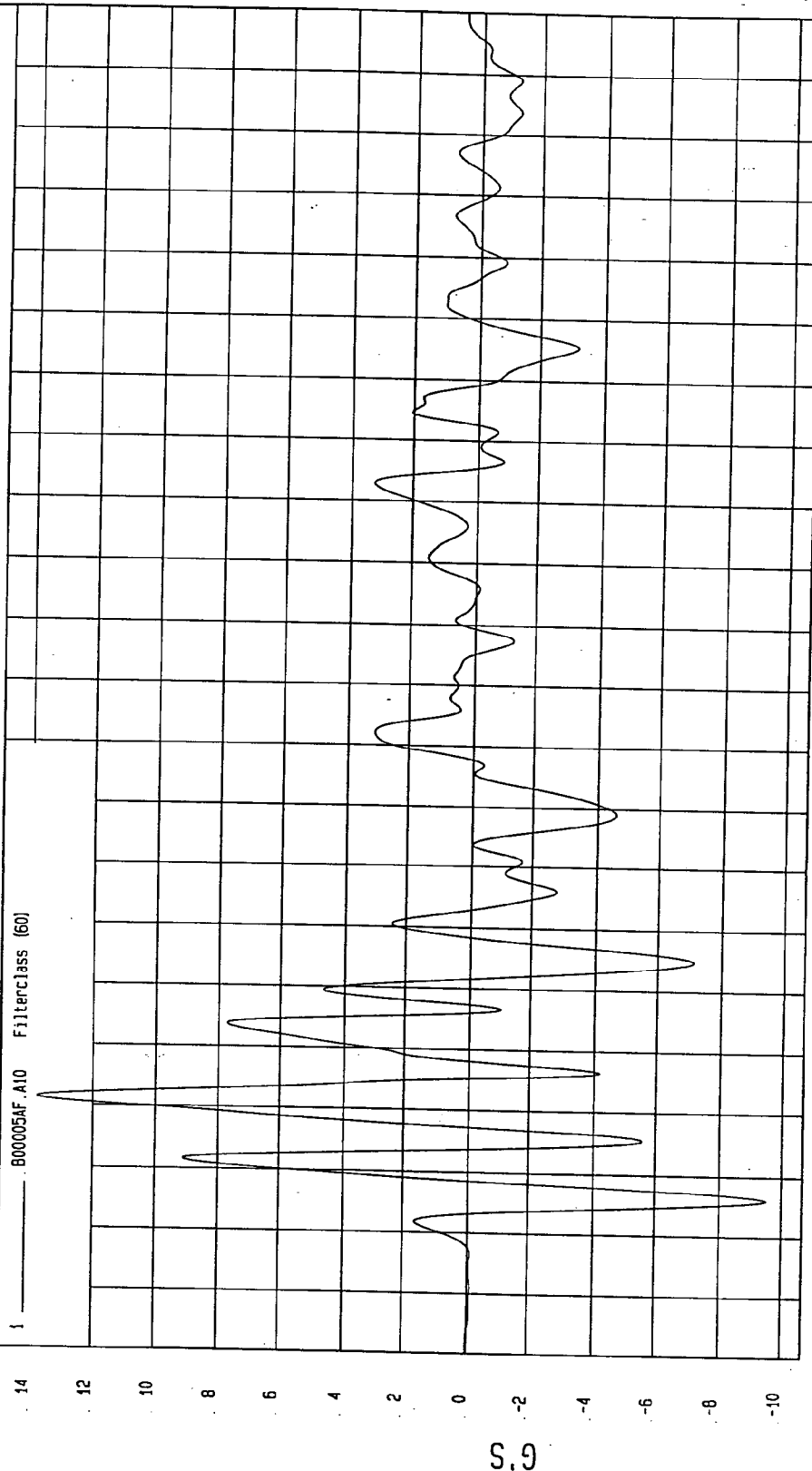
Speed: 38.5 MPH 62 KPH

Minimum = -9.49 G'S at 6 msec

Maximum = 13.78 G'S at 21 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION

1 800005AF.A10 Filterclass (60)

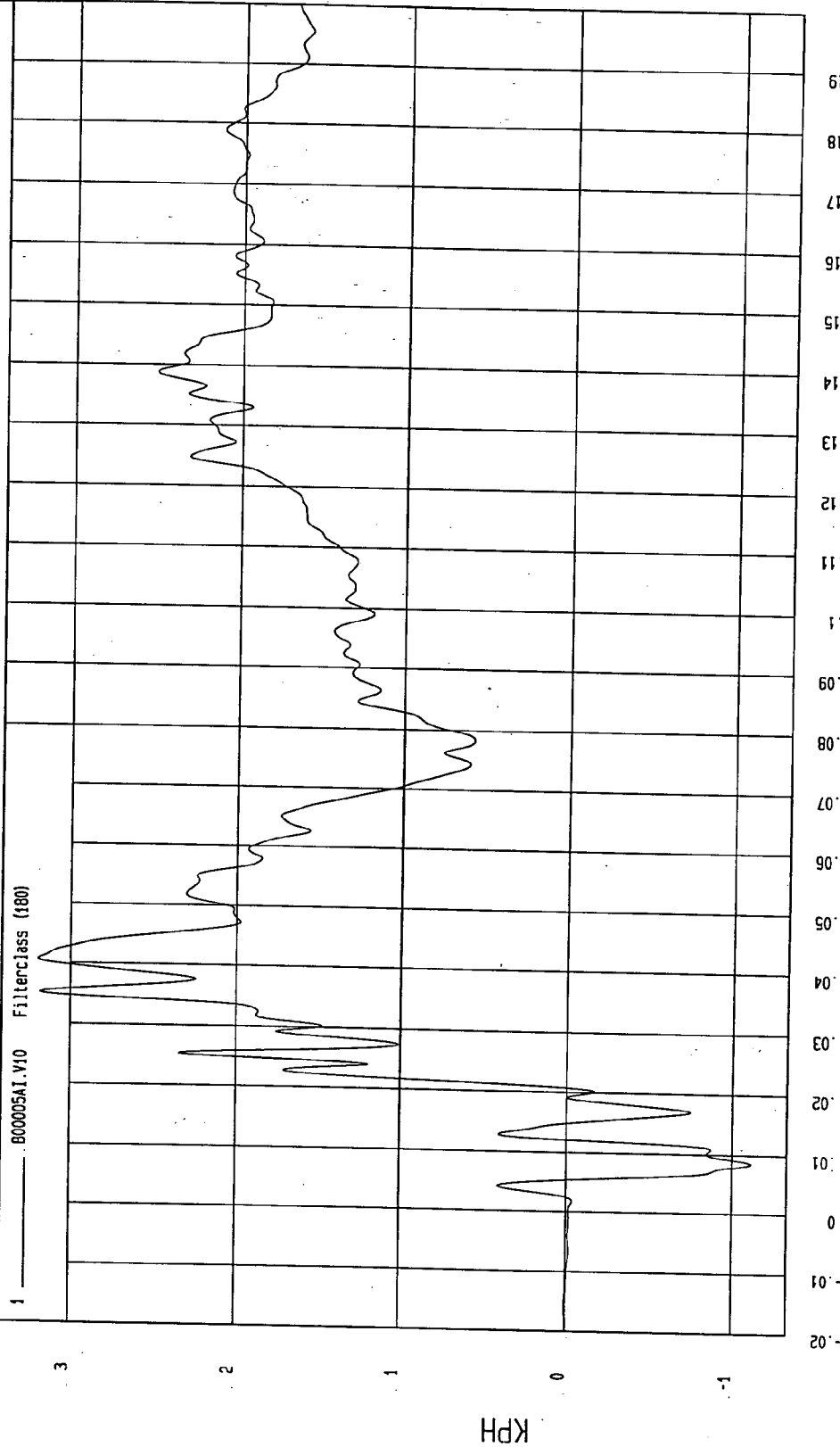
MGA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -1.12 KPH at 0 msec Maximum = 3.2 KPH at 41 msec

REAR FLOORPAN ABOVE AXLE Z VELOCITY



TEST: FMVSS 214 INDICANT

COMPONENT: 2000 TOYOTA AVALON (CY5102)

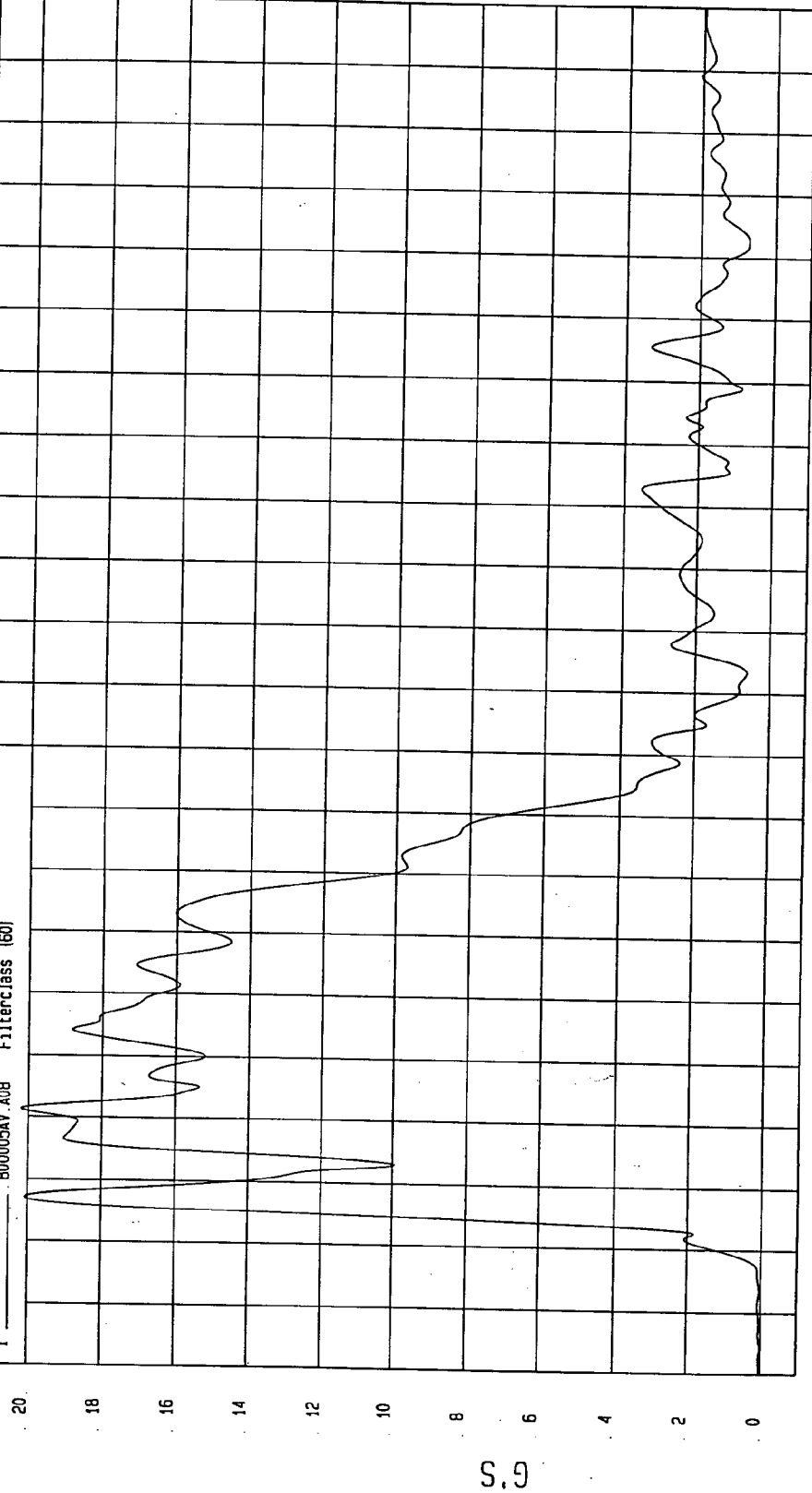
Speed: 38.5 MPH 62 KPH

Minimum = 1.58E-02 G'S at -16 msec

Maximum = 20.2 G'S at 21 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

1 800005AV.A08 Filterclass (60)



NCA Research
01-19-2000 14:48

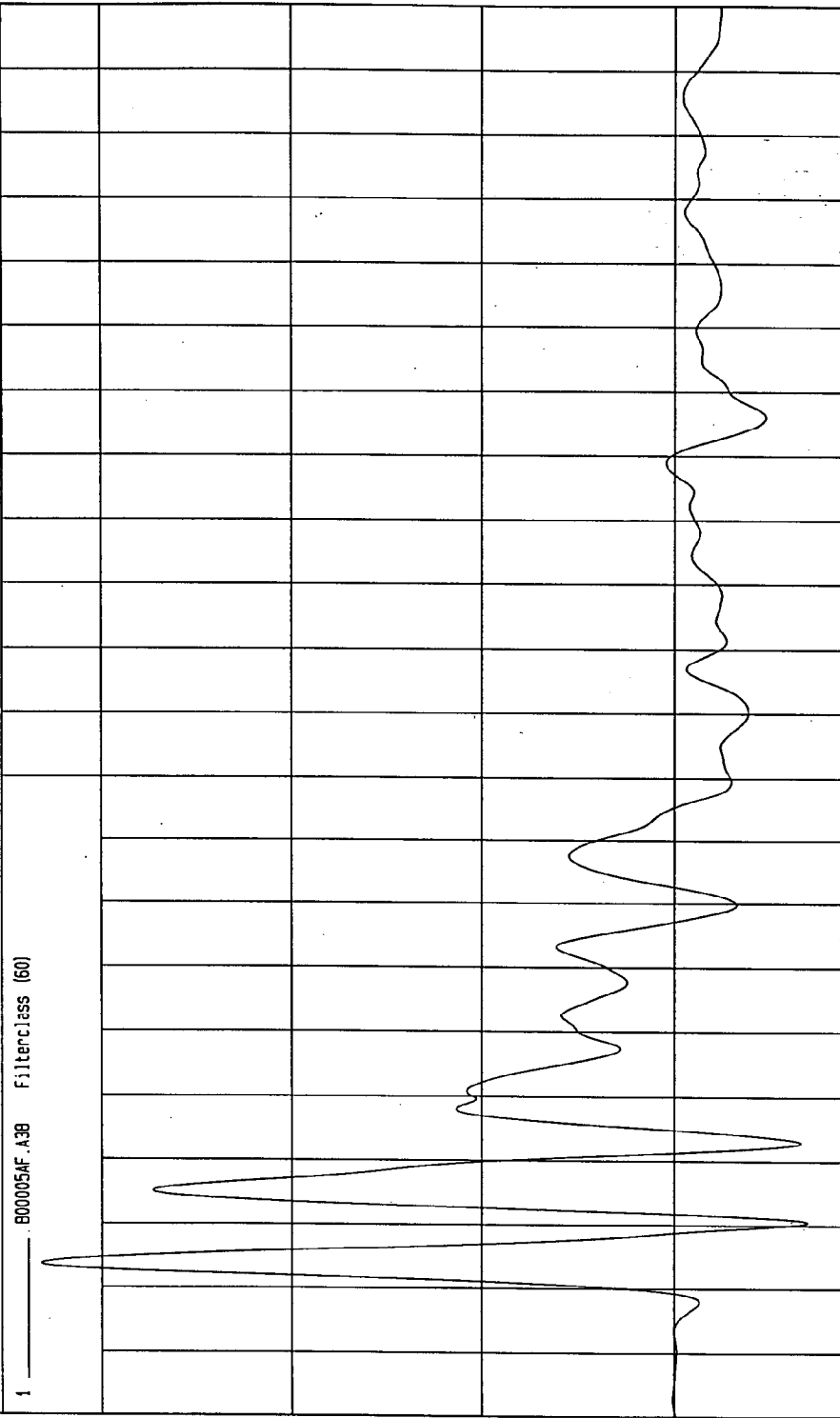
TIME (SECONDS)

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -6.87 G'S at 10 msec Maximum = 33.13 G'S at 4 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION



TIME (SECONDS)

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.1 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

NEA Research
01-19-2000 14:46

G's

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

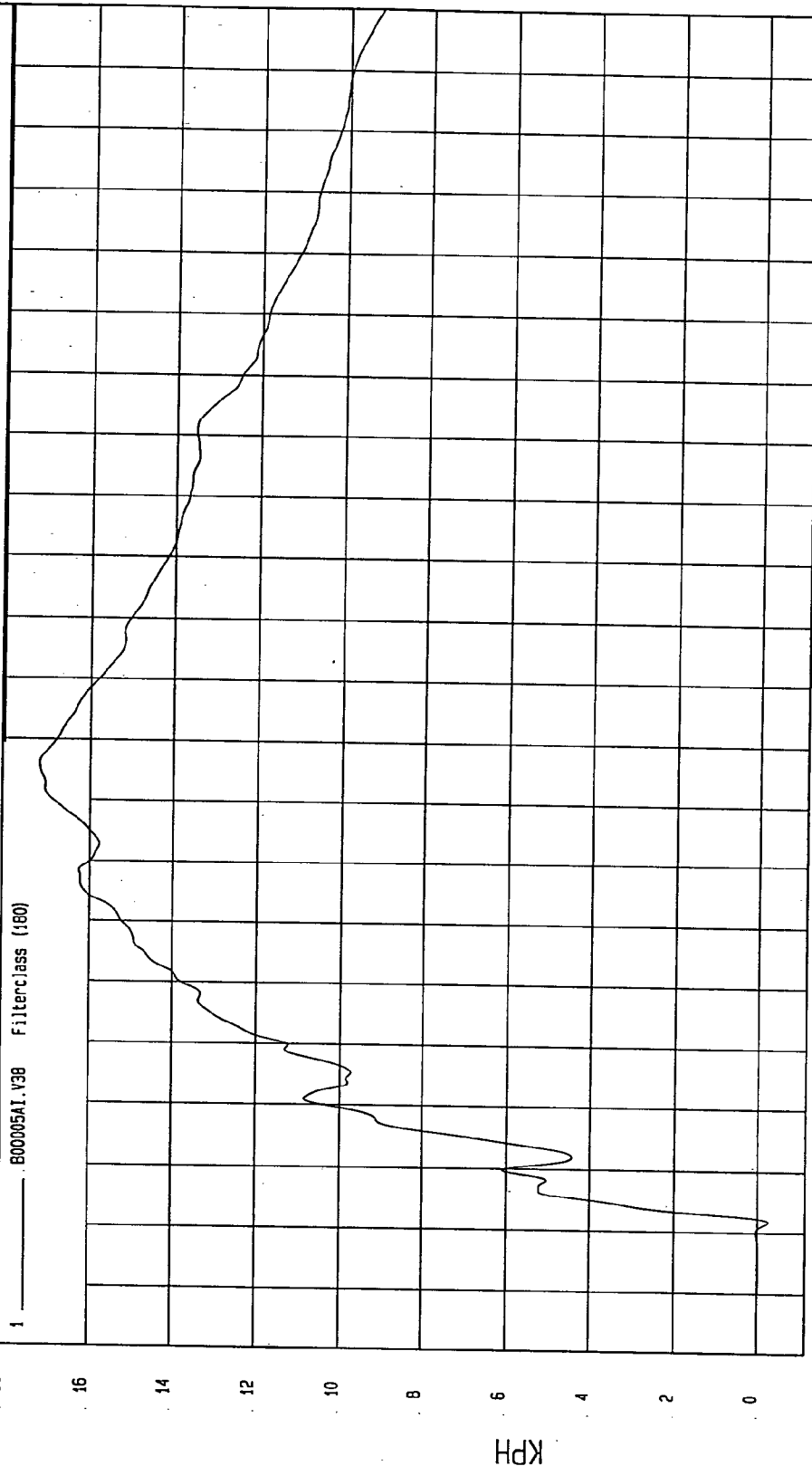
Minimum = -.27 KPH at 2 msec

Maximum = 17.18 KPH at 76 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY

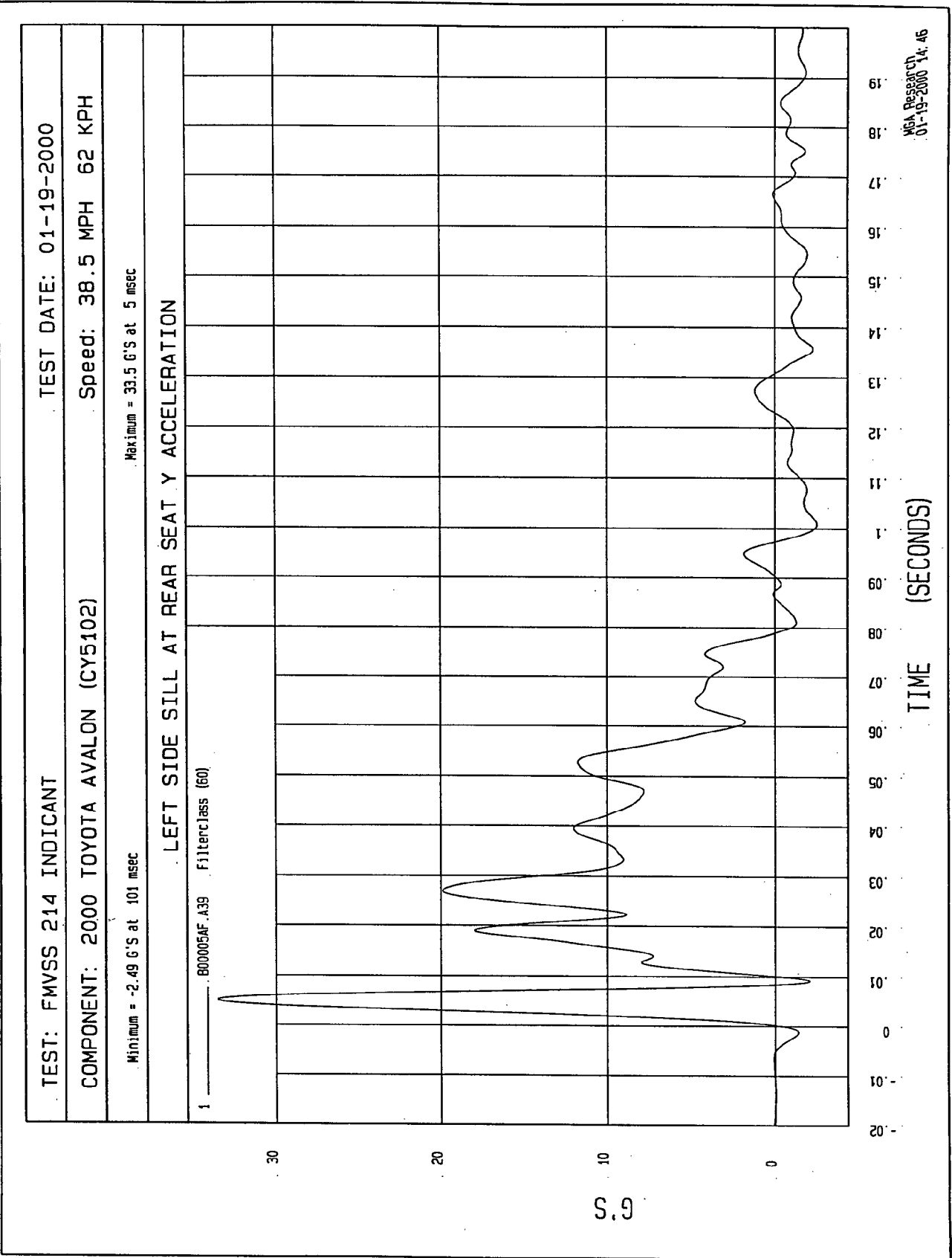
18

1 — B00005A1.V38 FilterClass (180)



TIME Seconds

NSA Research
01-19-2000 14:46



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

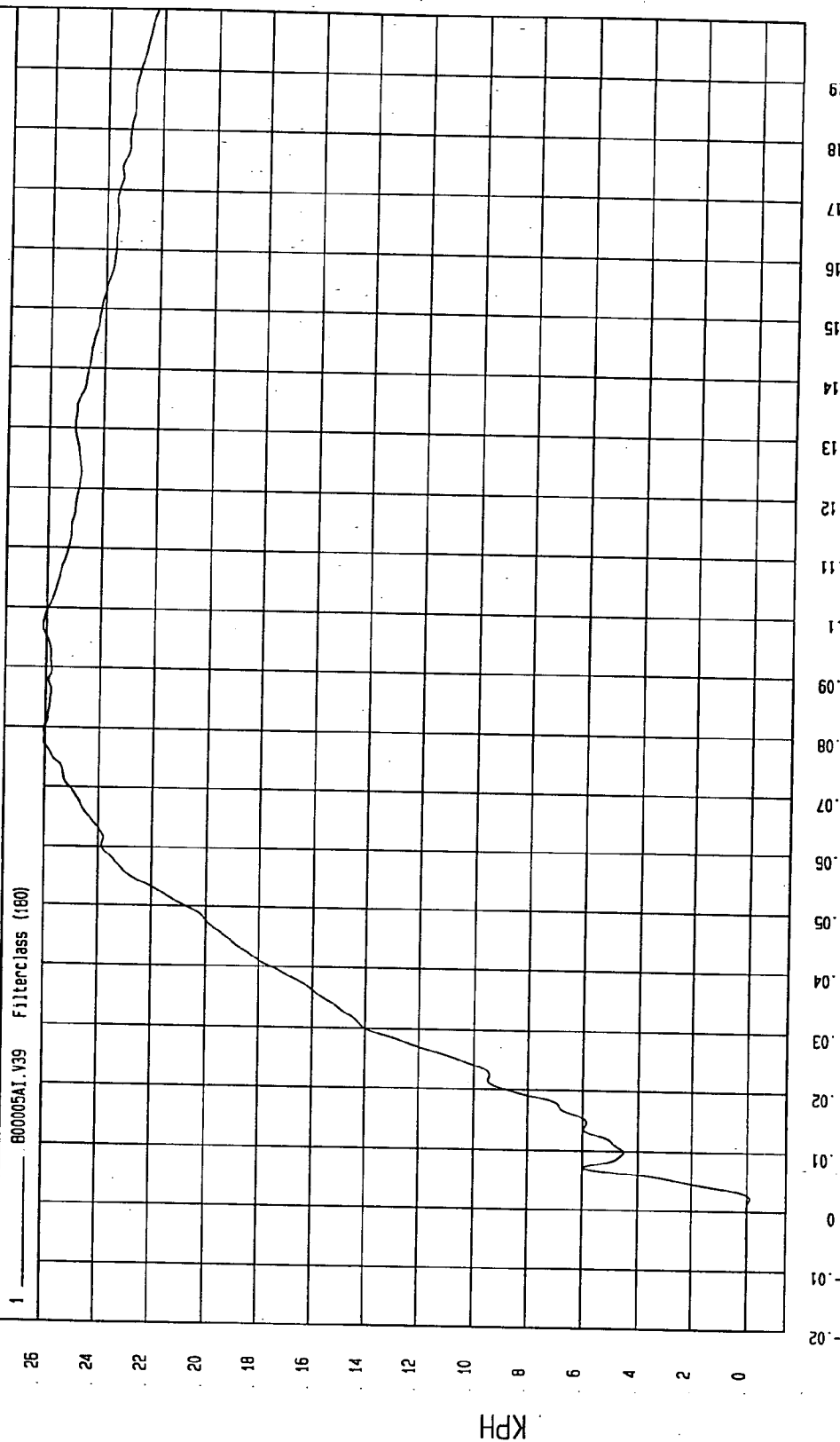
Speed: 38.5 MPH 62 KPH

Minimum = -.11 KPH at 2 msec

Maximum = 26.13 KPH at 97 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY

1 — 80005AI.V39 Filterclass (160)

MGA Research
01-19-2000 14:46

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

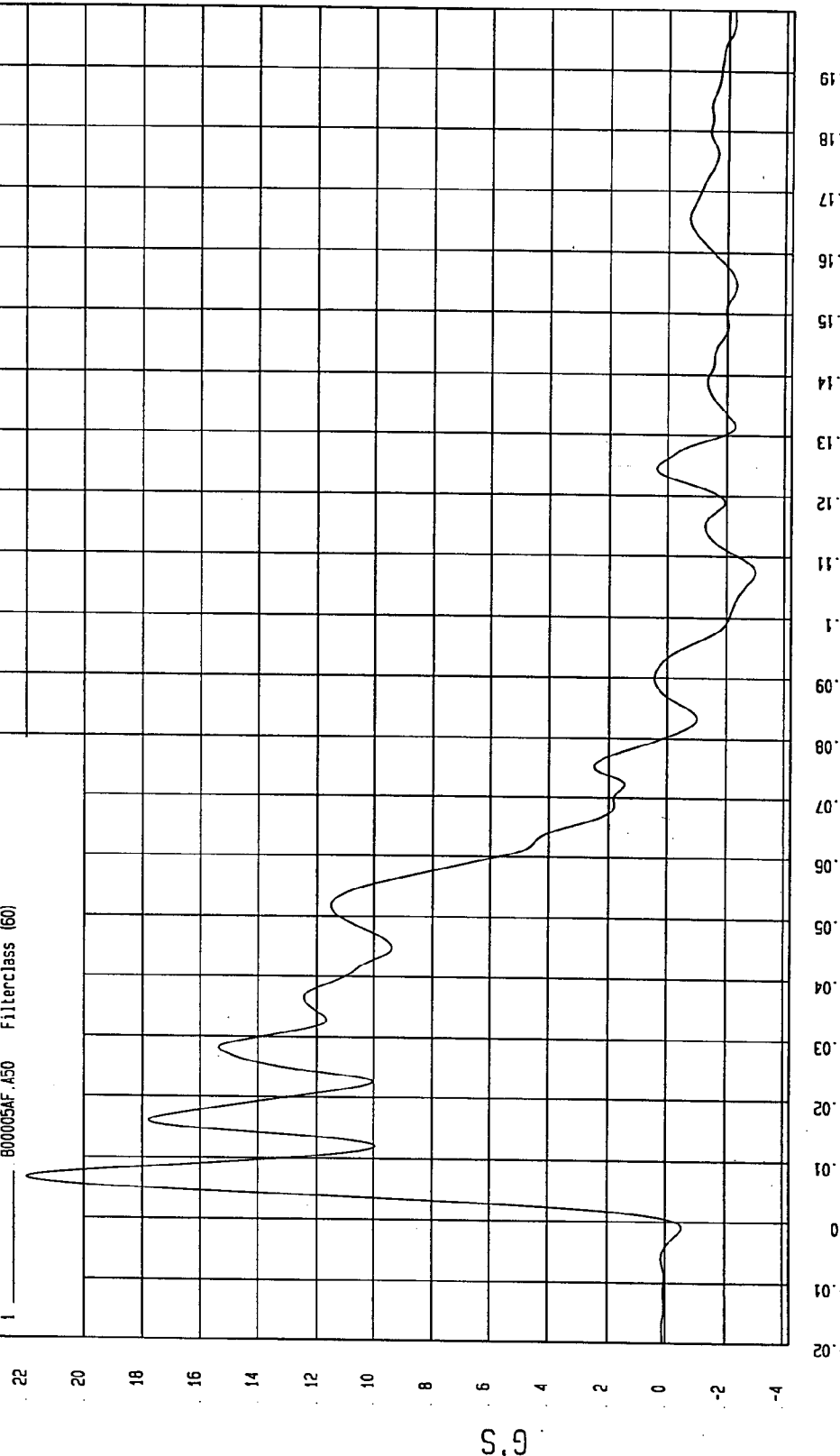
Speed: 38.5 MPH 62 KPH

Minimum = -2.98 G'S at 107 msec

Maximum = 22 G'S at 7 msec

RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION

1 800005AF .450 Filterclass (60)



NSA Research
01-19-2000 14:48

TIME (SECONDS)

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

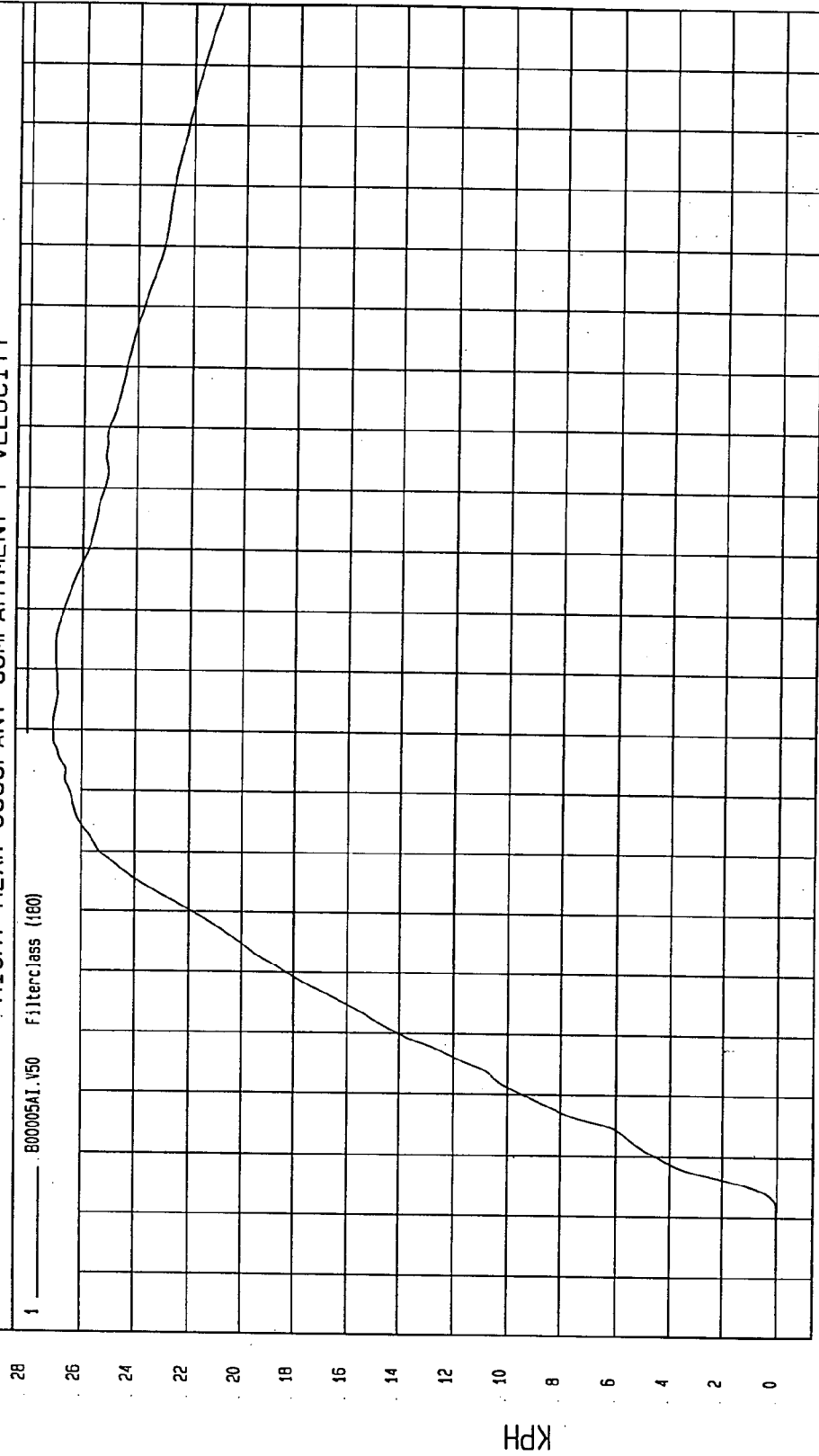
Speed: 38.5 MPH 62 KPH

Minimum = 0 KPH at -20 msec

Maximum = 27.08 KPH at 81 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY

1 ——— B00005A1.V50 Filterclass (160)



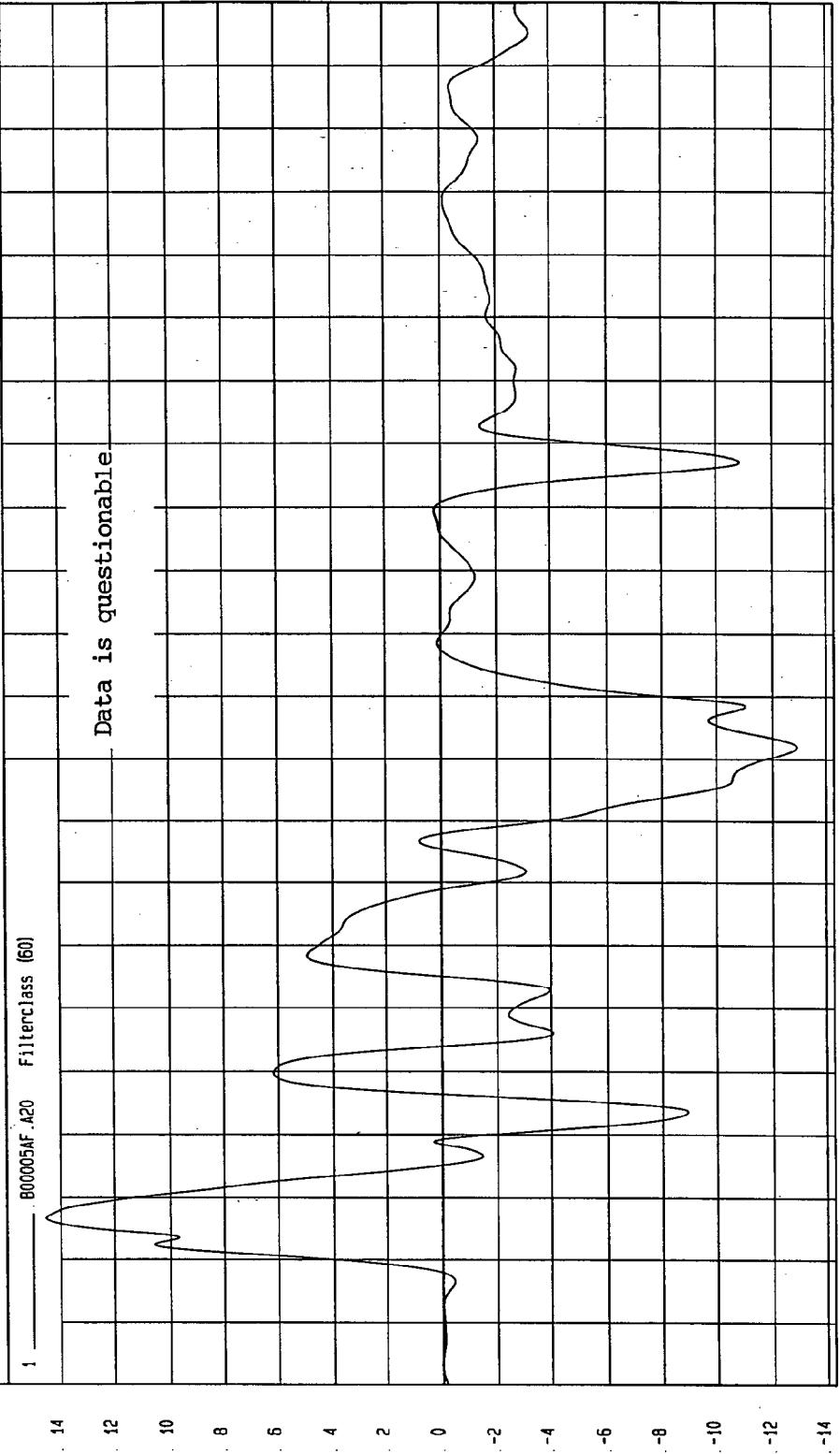
WCA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -12.92 G'S at 82 msec Maximum = 14.55 G'S at 7 msec

LEFT LOWER A-POST Y ACCELERATION



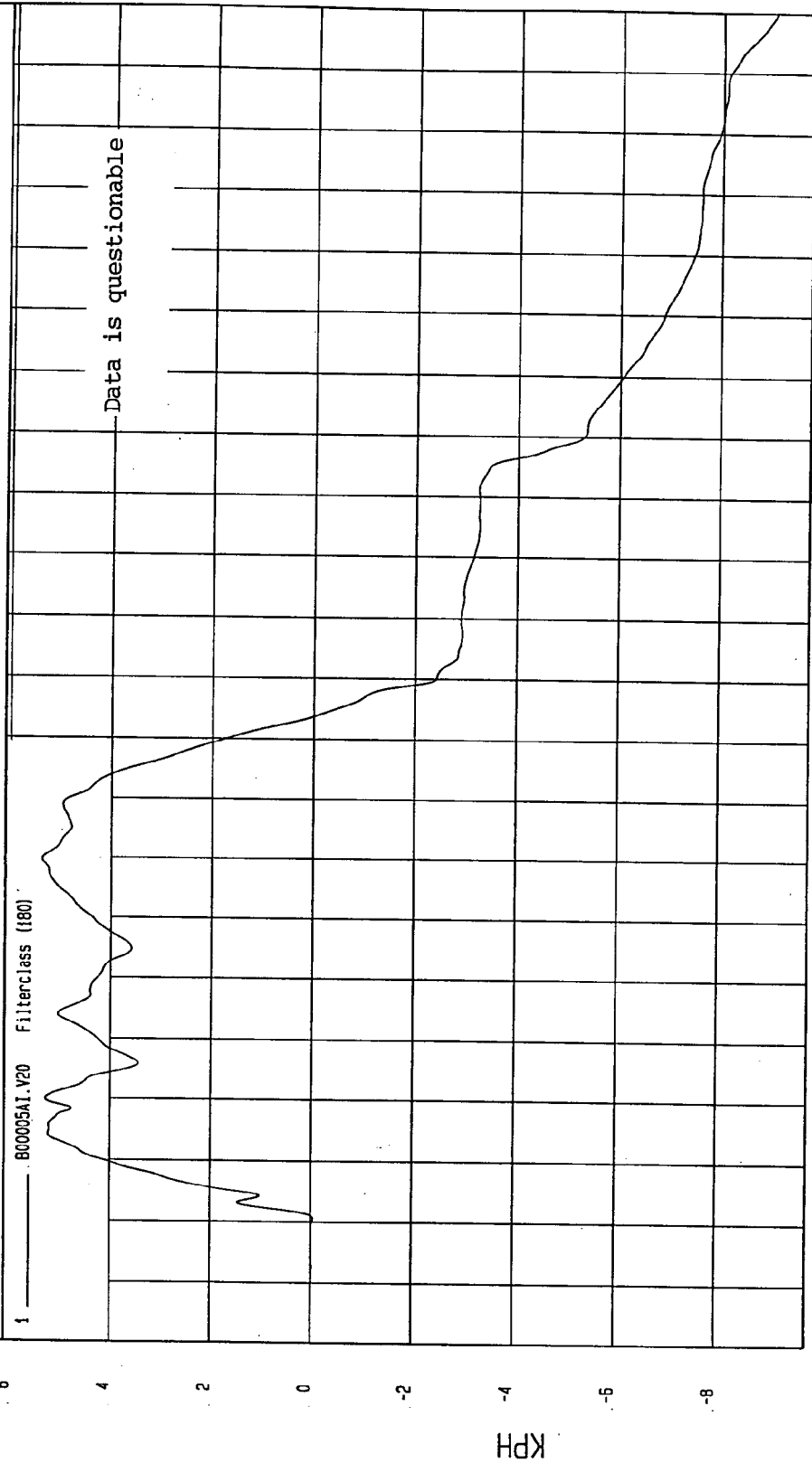
MCA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -9.09 KPH at 200 msec Maximum = 5.38 KPH at 60 msec

LEFT LOWER A-POST Y VELOCITY



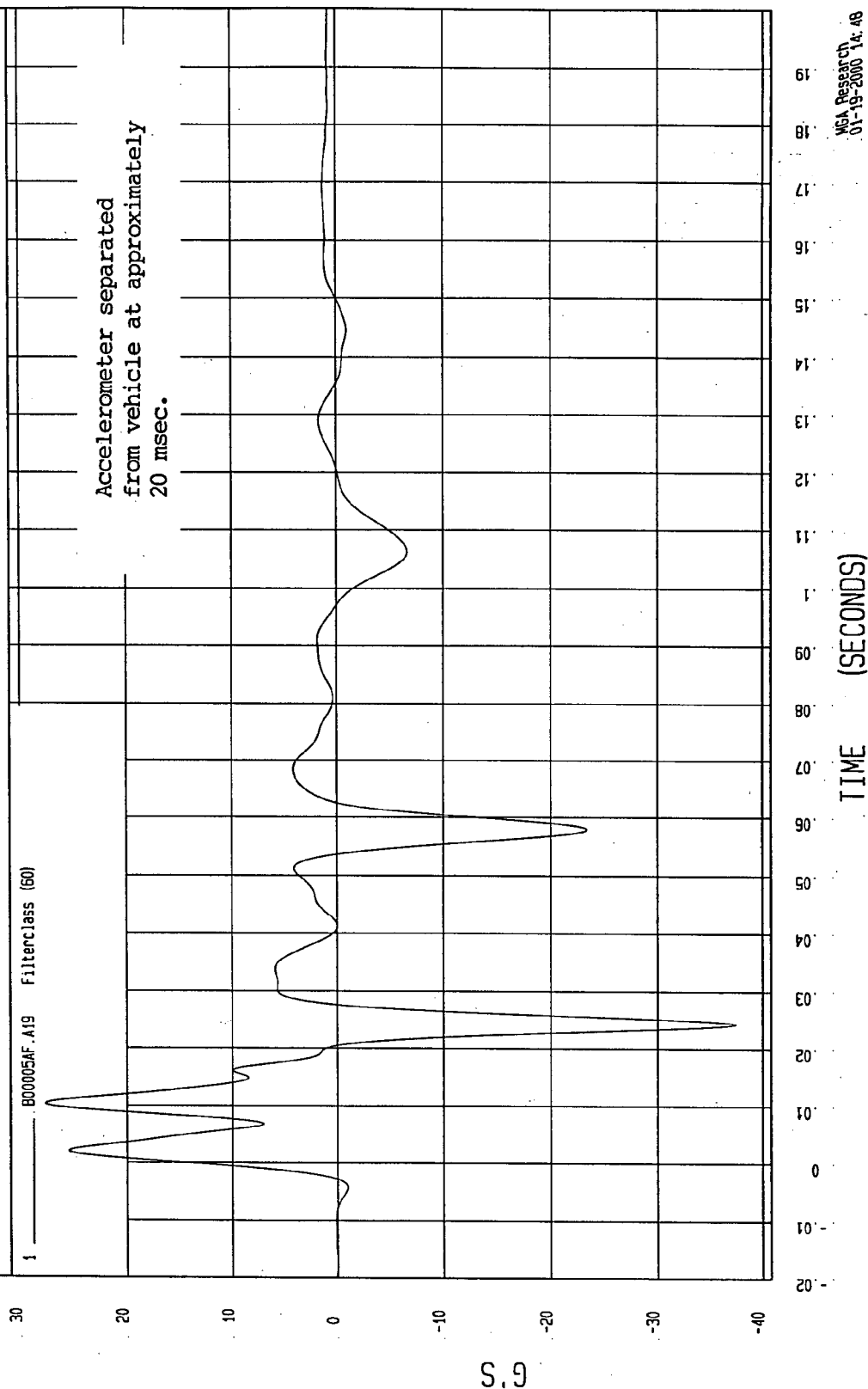
MGA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -37.52 G'S at 24 msec Maximum = 27.68 G'S at 10 msec

LEFT MID A-POST Y ACCELERATION



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

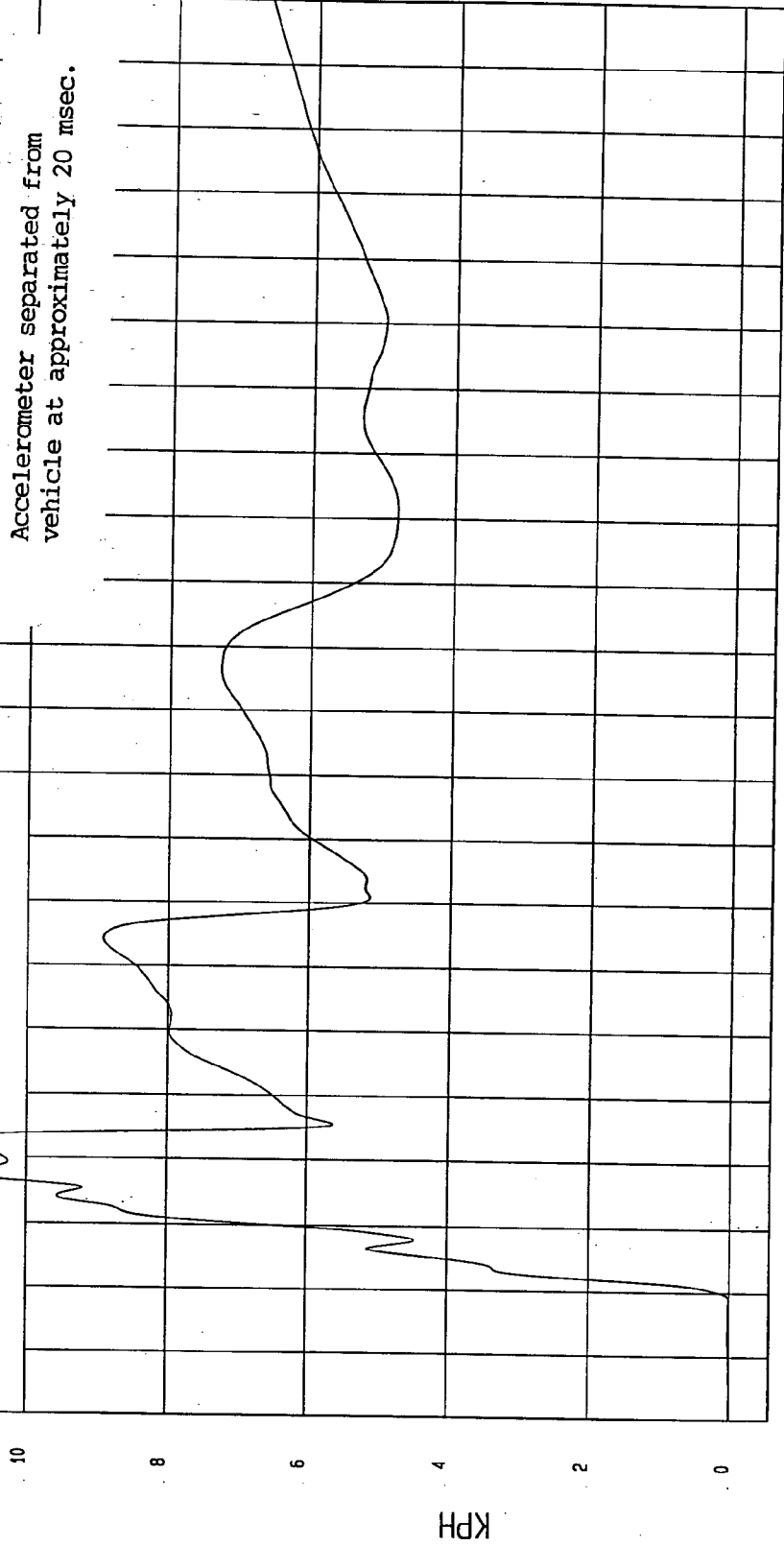
Minimum = -8.85E-03 KPH at -16 msec

Maximum = 11.02 KPH at 23 msec

LEFT MID A-POST Y VELOCITY

1 ——— B00005A1.V19 Filterclass (180)

Accelerometer separated from vehicle at approximately 20 msec.



NCA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

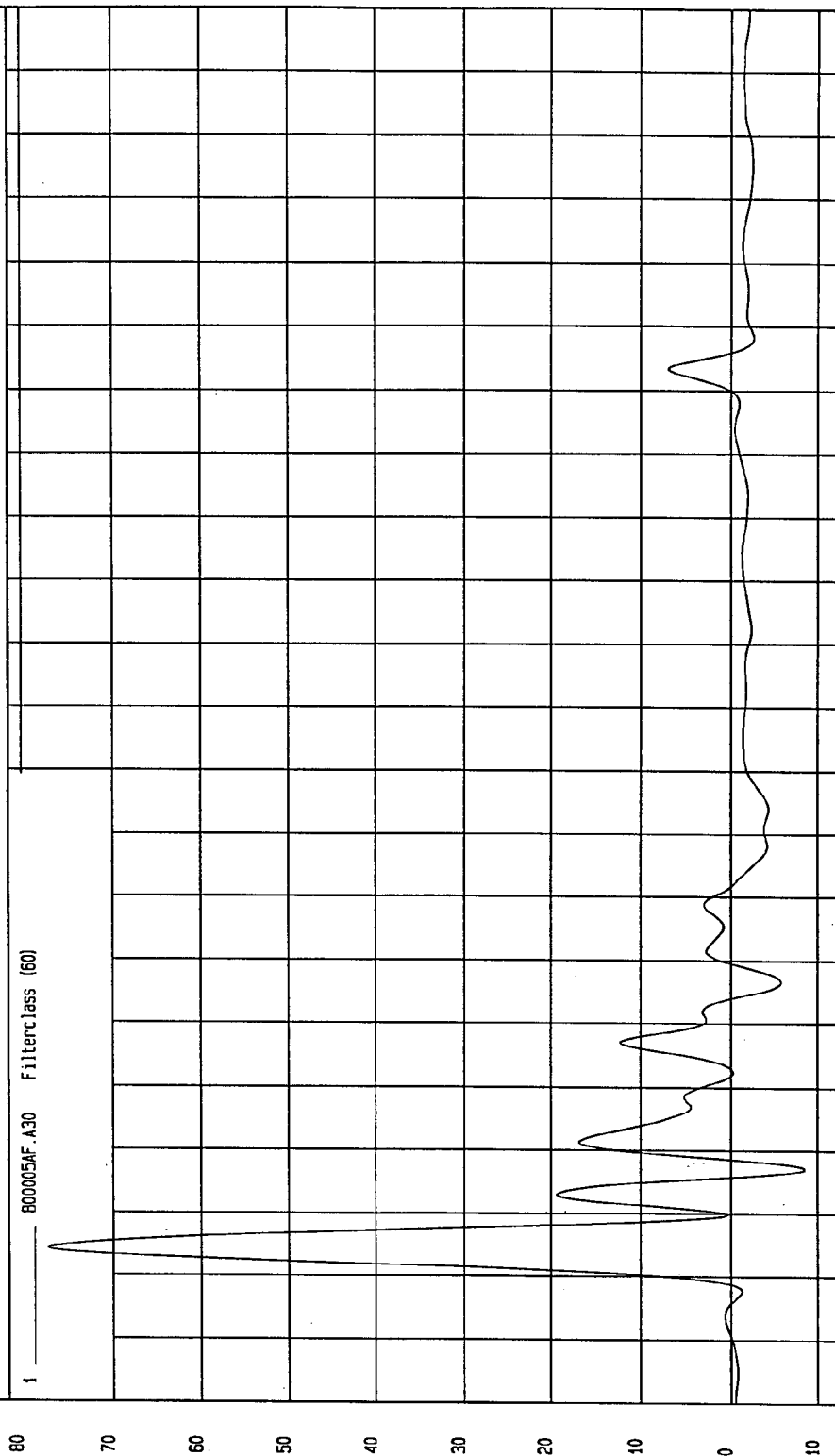
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 77.15 G'S at 4 msec

Minimum = -8.55 G'S at 17 msec

LEFT LOWER B-POST Y ACCELERATION

1 800005AF.A30 Filterclass (60)



NCA Research
01-19-2000 14:48

TIME (SECONDS)

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

Minimum = -21 KPH at -9 msec

Maximum = 22.31 KPH at 44 msec

LEFT LOWER B-POST Y VELOCITY

1 ——— B00005A1.V30 Filterclass (480)



MOA Research
01-19-2000 14:48

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

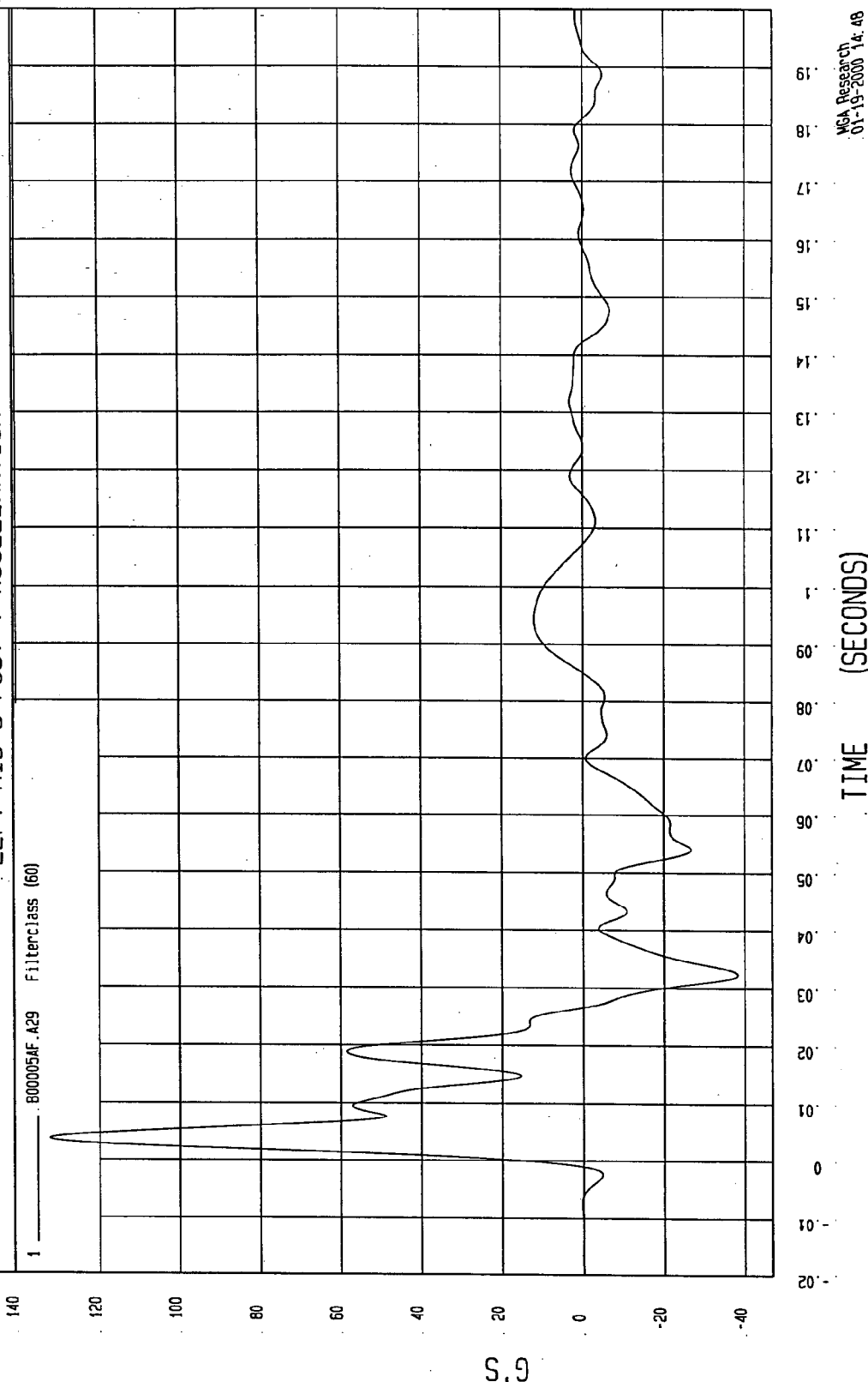
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 132.11 G'S at 4 msec

Minimum = -38.26 G'S at 32 msec

LEFT MID B-POST Y ACCELERATION



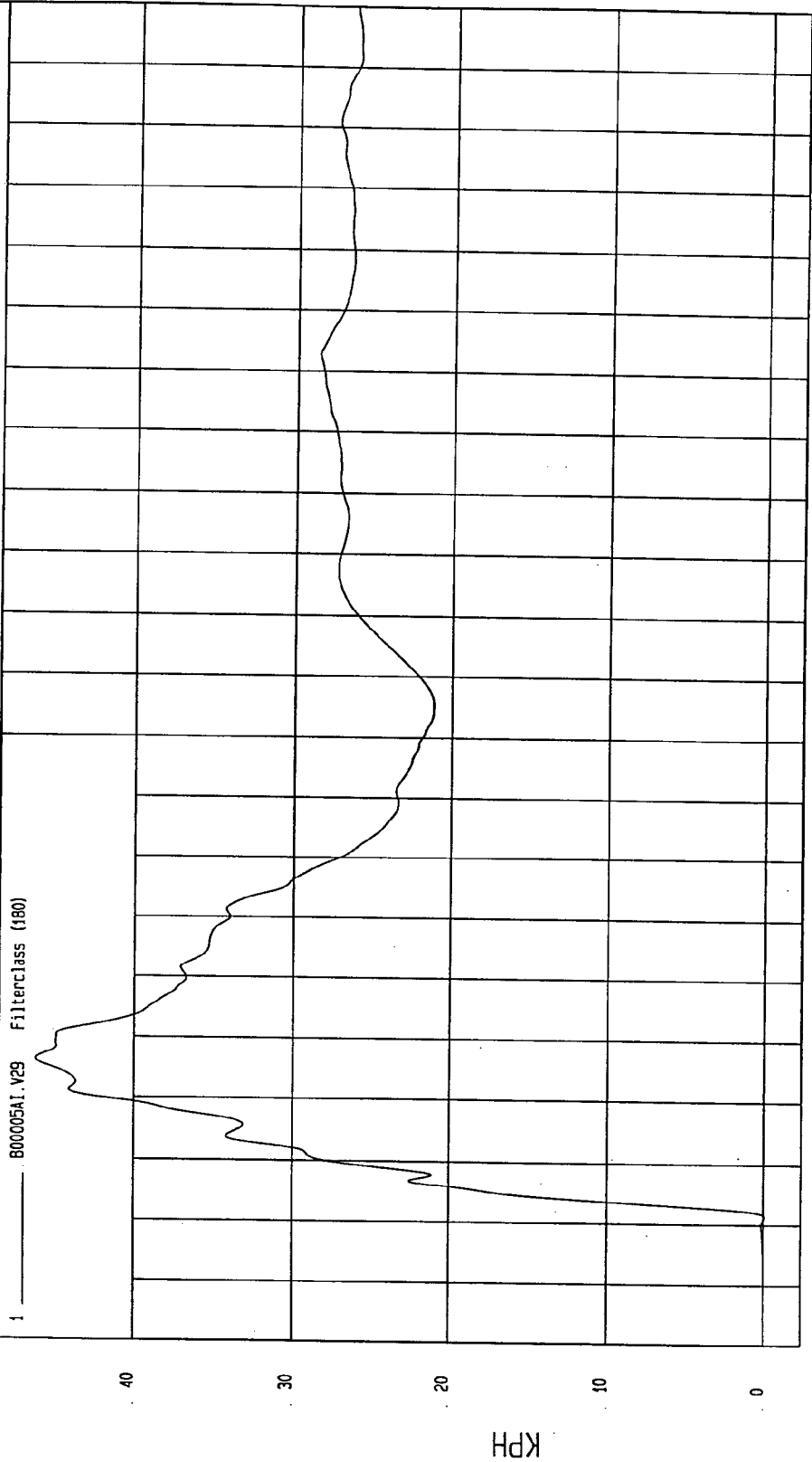
WCA Research
01-19-2000 14:48

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

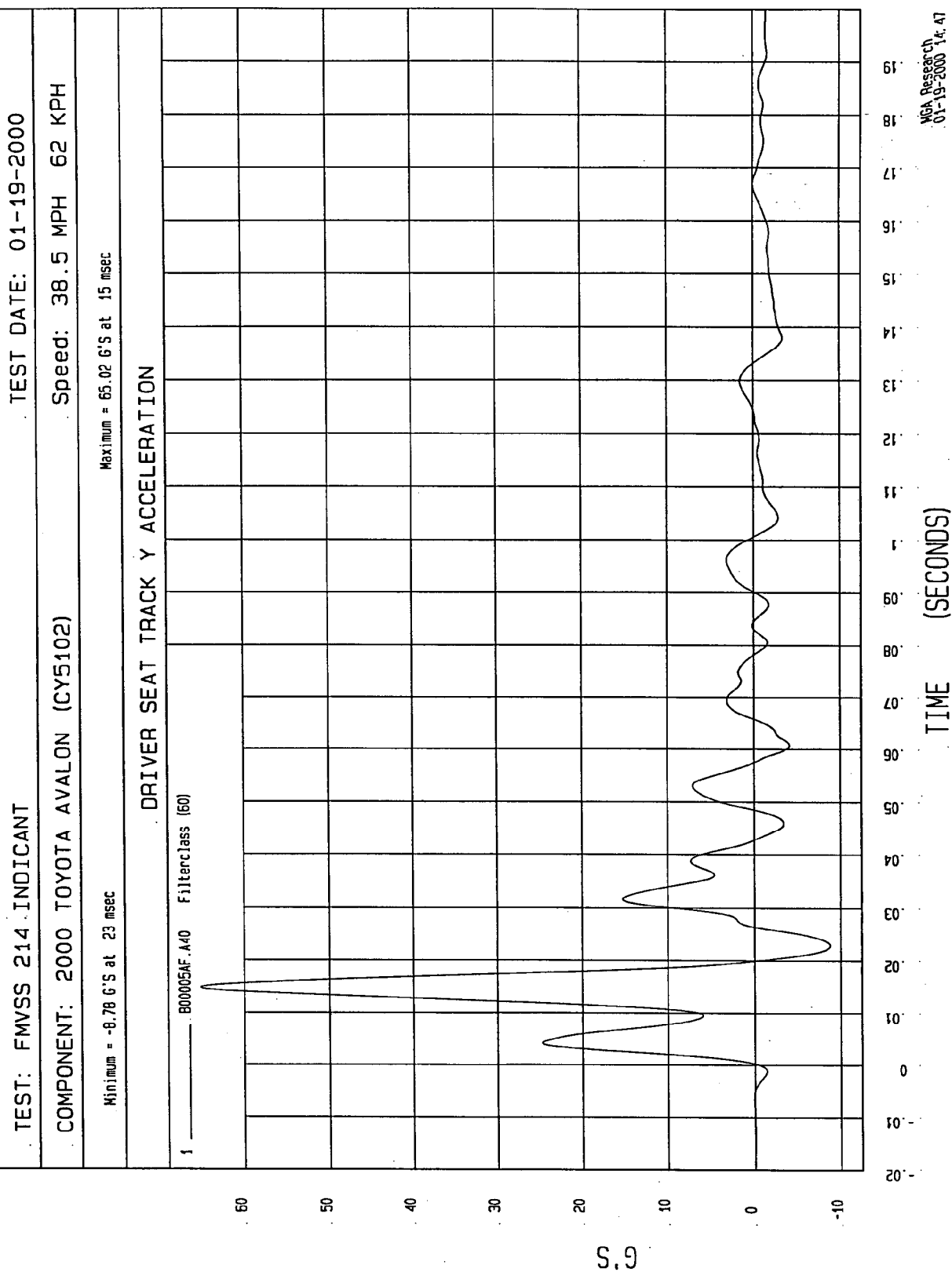
COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -7.10E-02 KPH at 1 msec Maximum = 46.25 KPH at 26 msec

LEFT MID B-POST Y VELOCITY

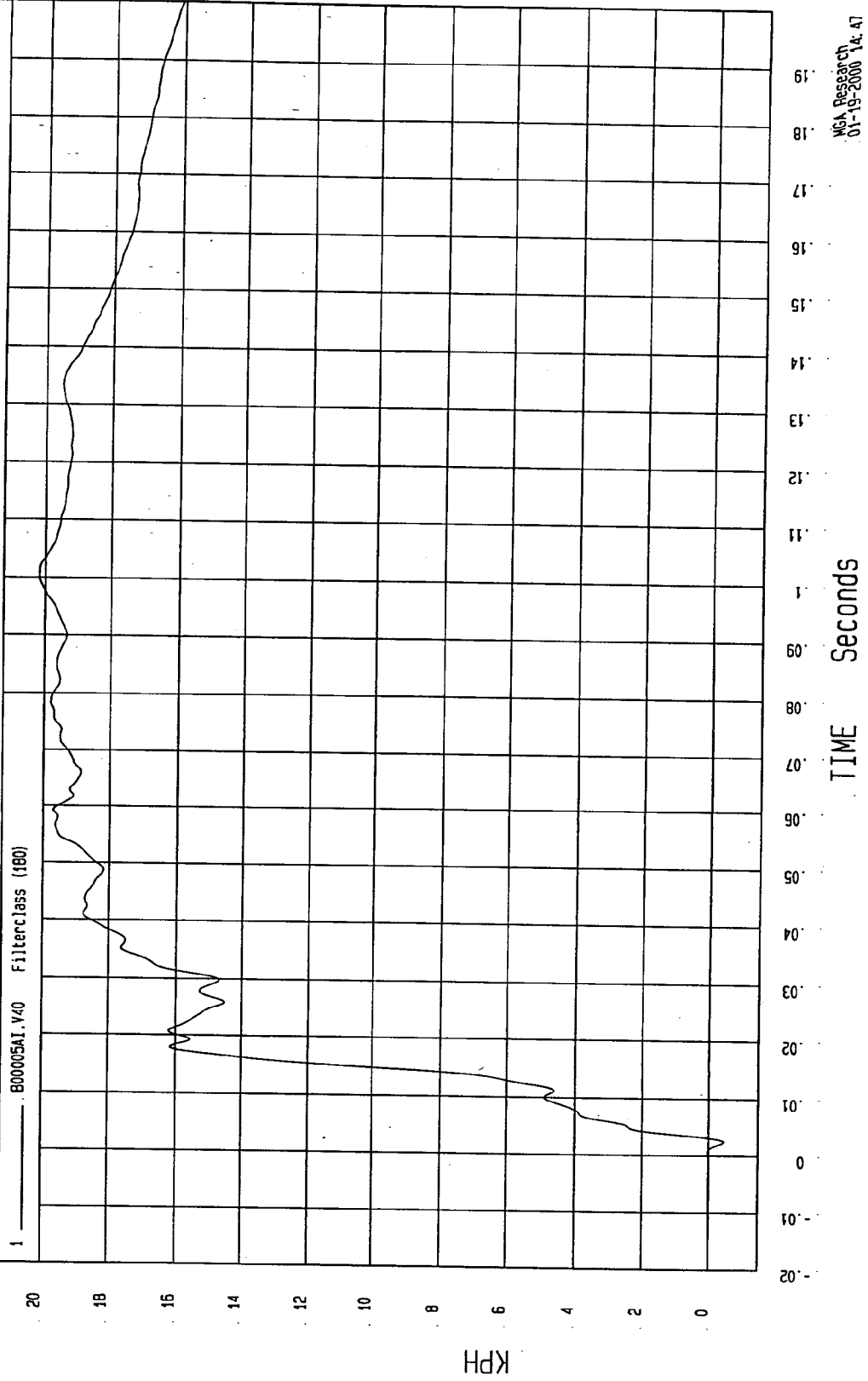


NGA Research
01-19-2000 14:48



TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH
Minimum = -.44 KPH at 2 msec Maximum = 20.17 KPH at 100 msec

DRIVER SEAT TRACK Y VELOCITY

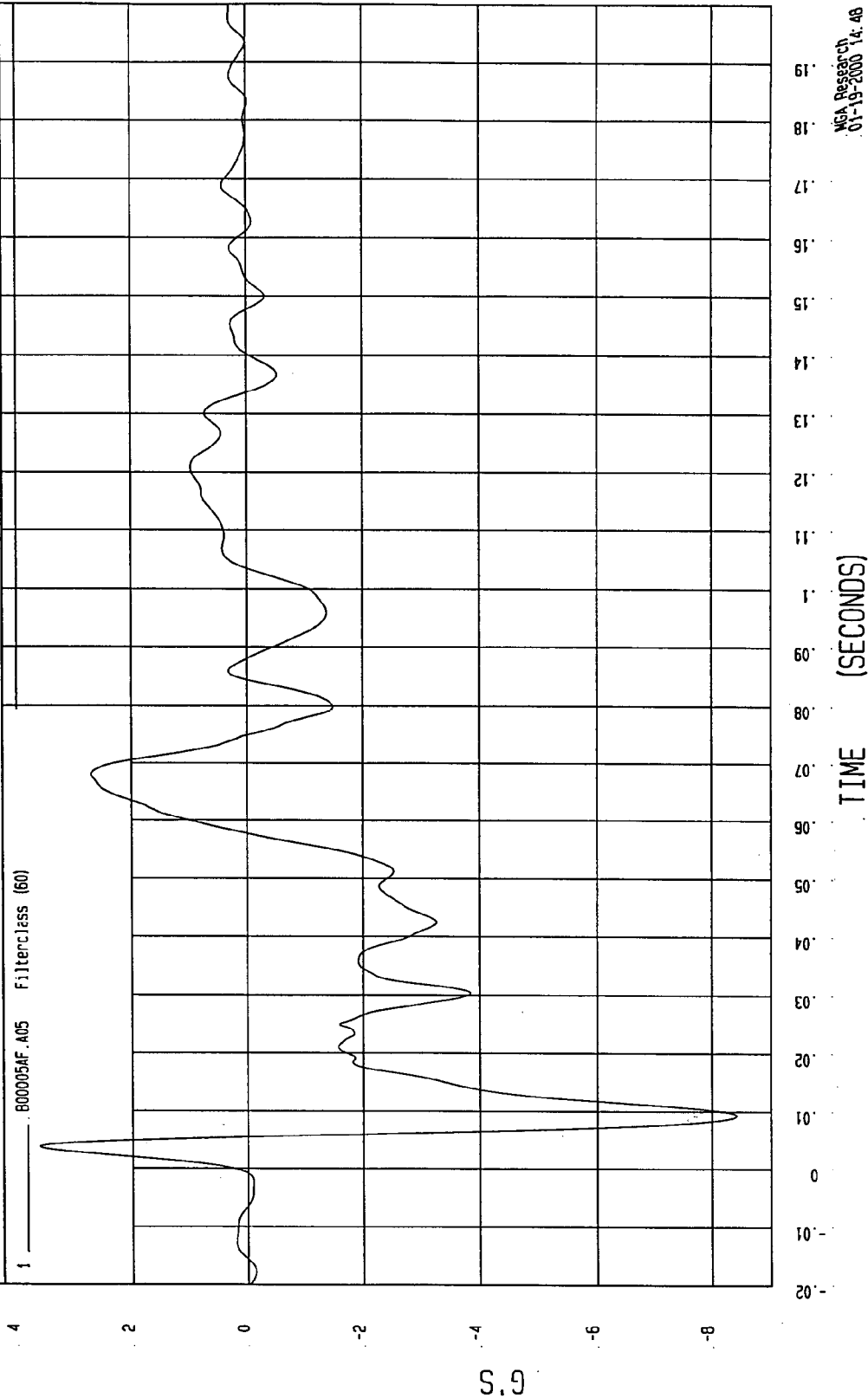


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

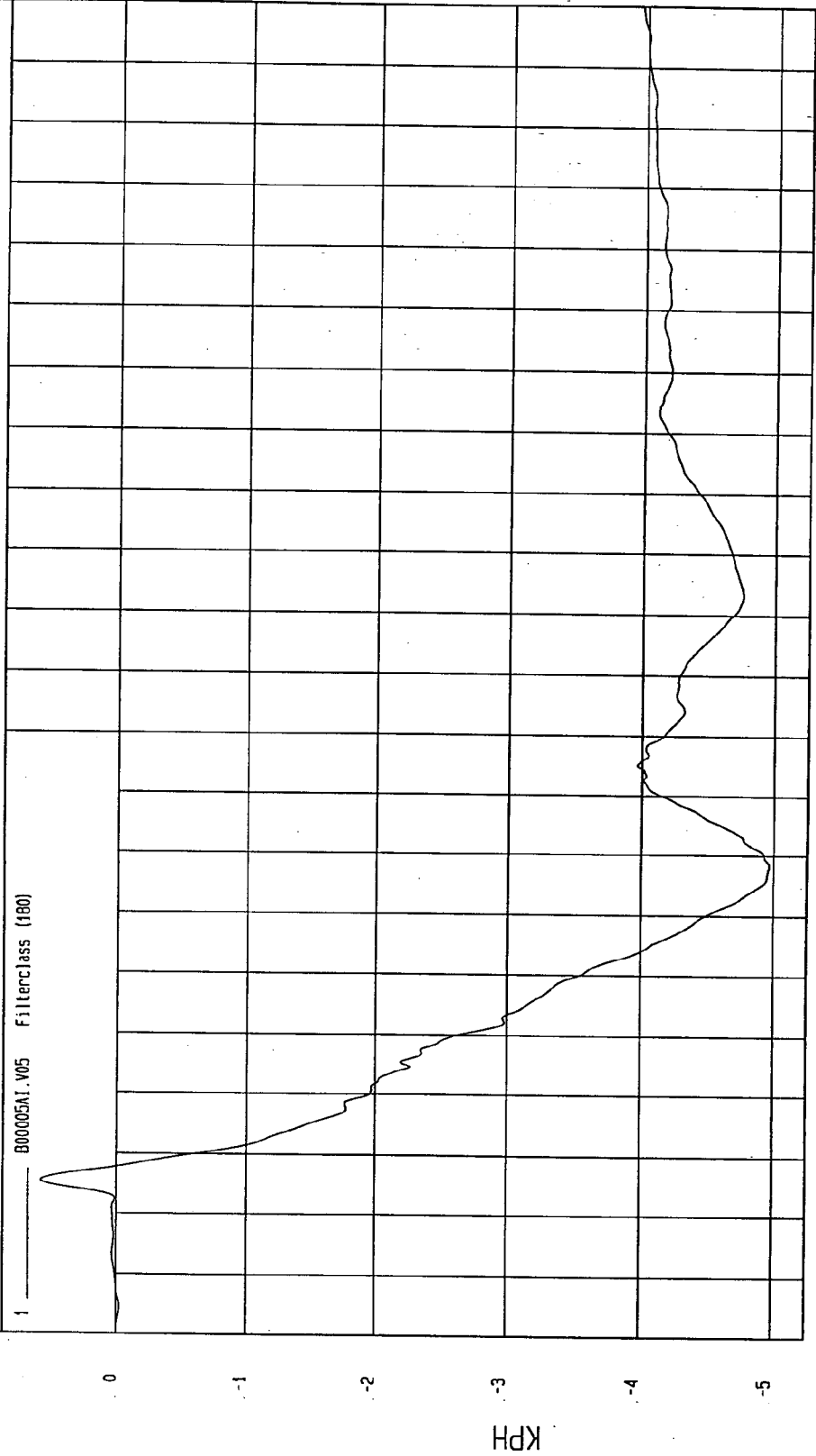
Minimum = -8.43 G's at 9 msec Maximum = 3.63 G's at 4 msec

VEHICLE CG X ACCELERATION



TEST: FMVSS 214 INDICANT
TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102)
Speed: 38.5 MPH 62 KPH
Minimum = -4.97 KPH at 58 msec
Maximum = .58 KPH at 5 msec

VEHICLE CG X VELOCITY



WCA Research
01-19-2000 14: 48

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

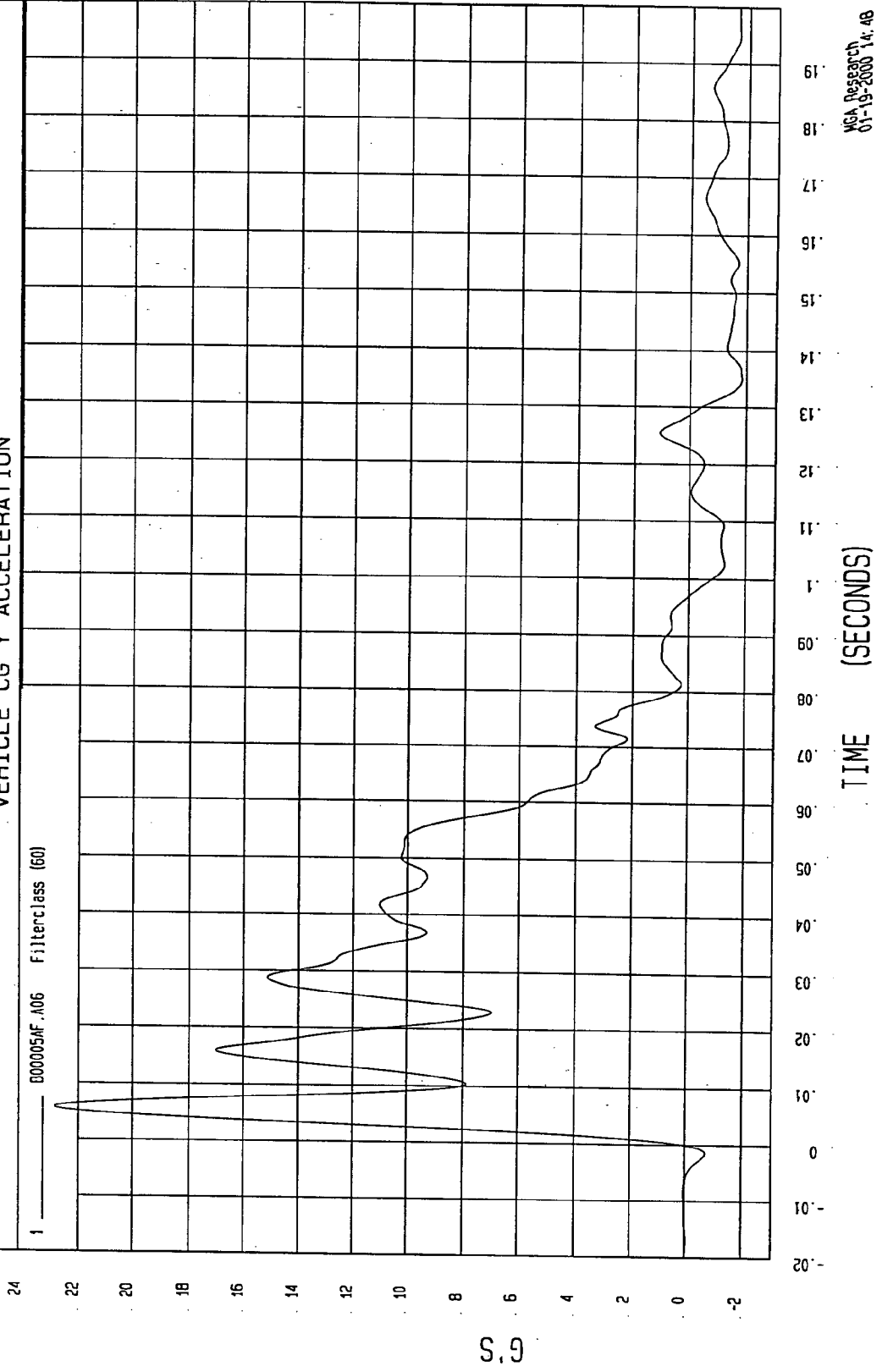
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 22.85 G'S at 6 msec

Minimum = -1.83 G'S at 135 msec

VEHICLE CG Y ACCELERATION



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

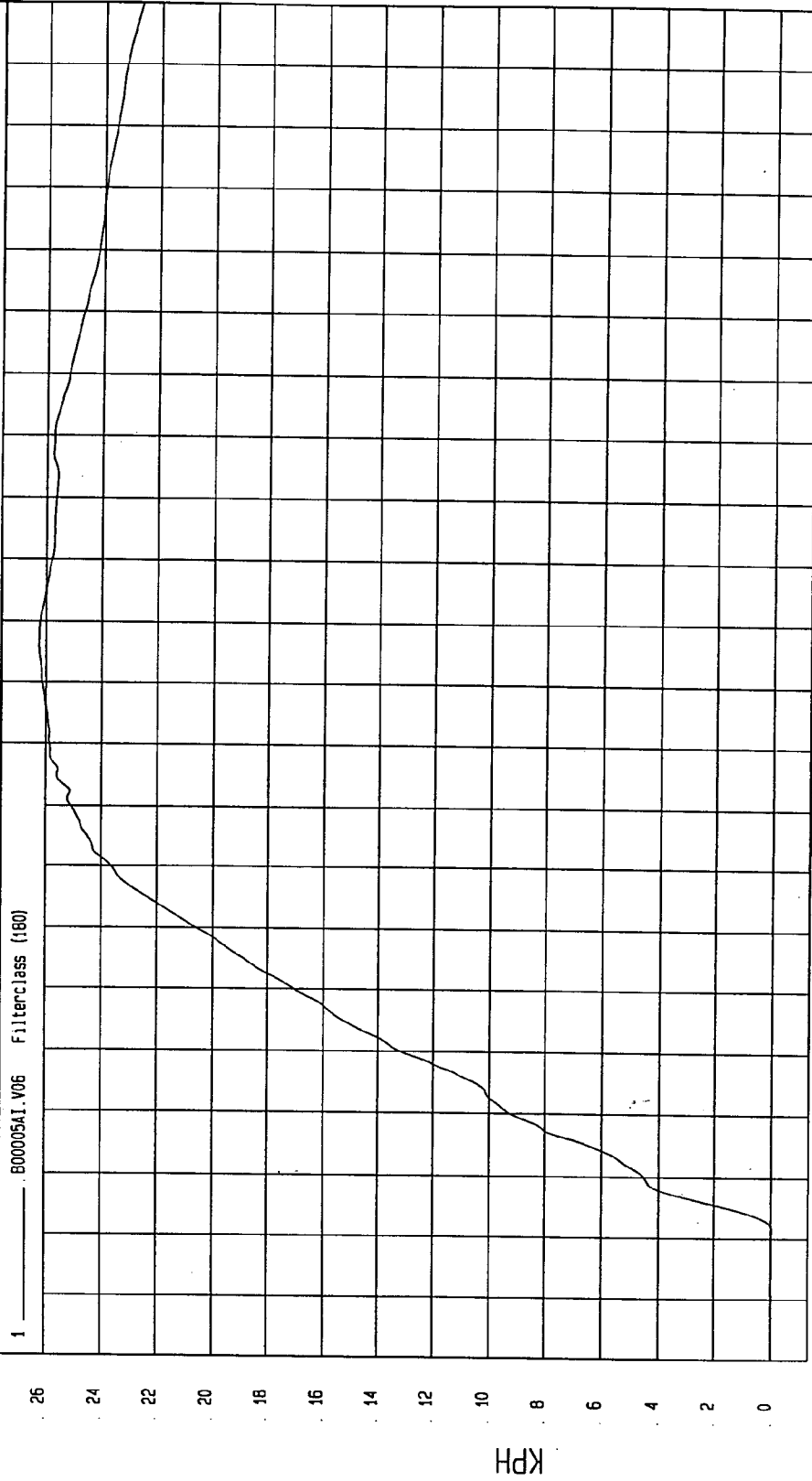
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -1.68E-02 KPH at 1 msec

Maximum = 26.25 KPH at 96 msec

VEHICLE CG Y VELOCITY



MCA Research
01-19-2000 14:48

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

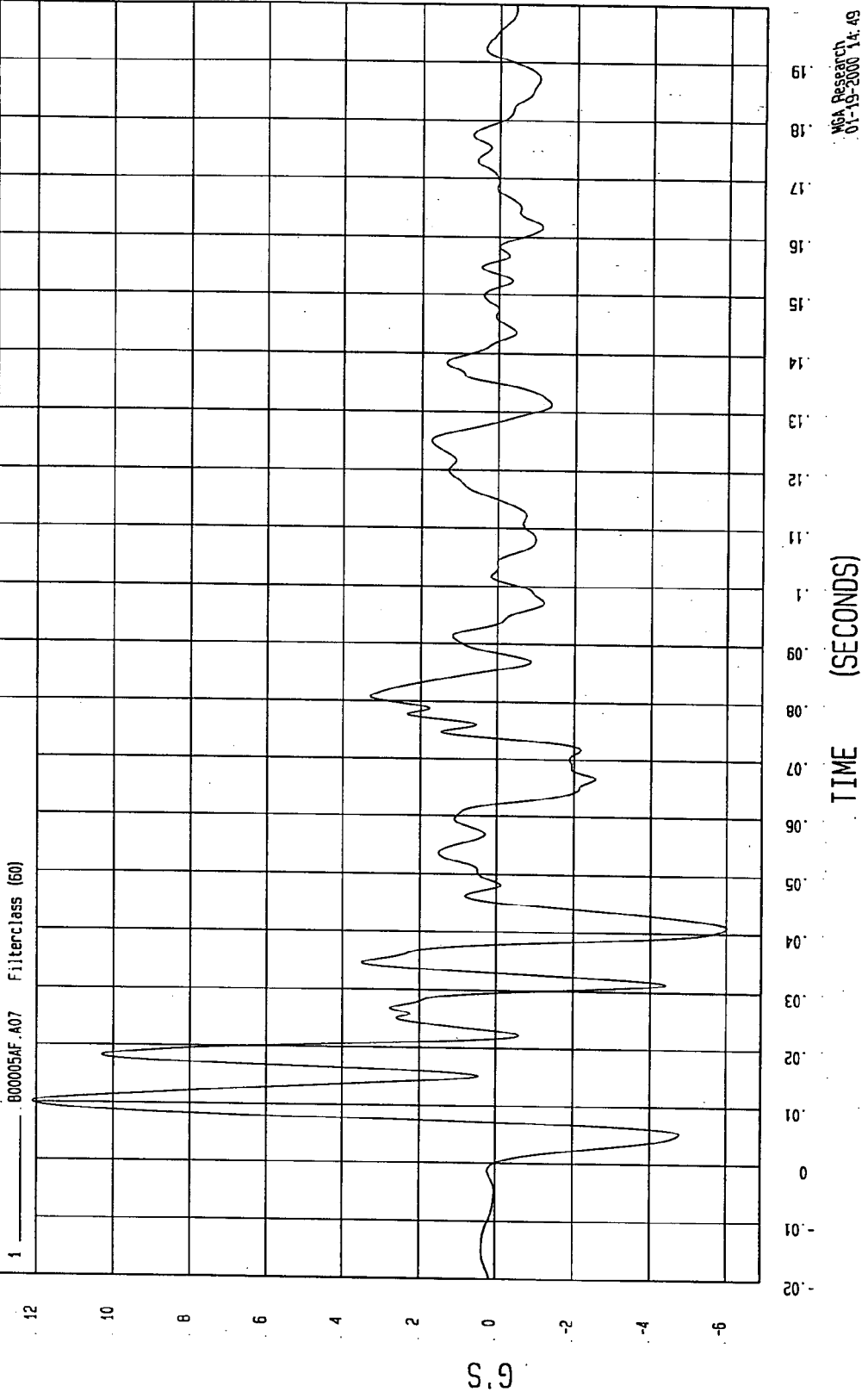
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 12.11 G'S at 10 msec

Minimum = -6.02 G'S at 41 msec

VEHICLE CG Z ACCELERATION

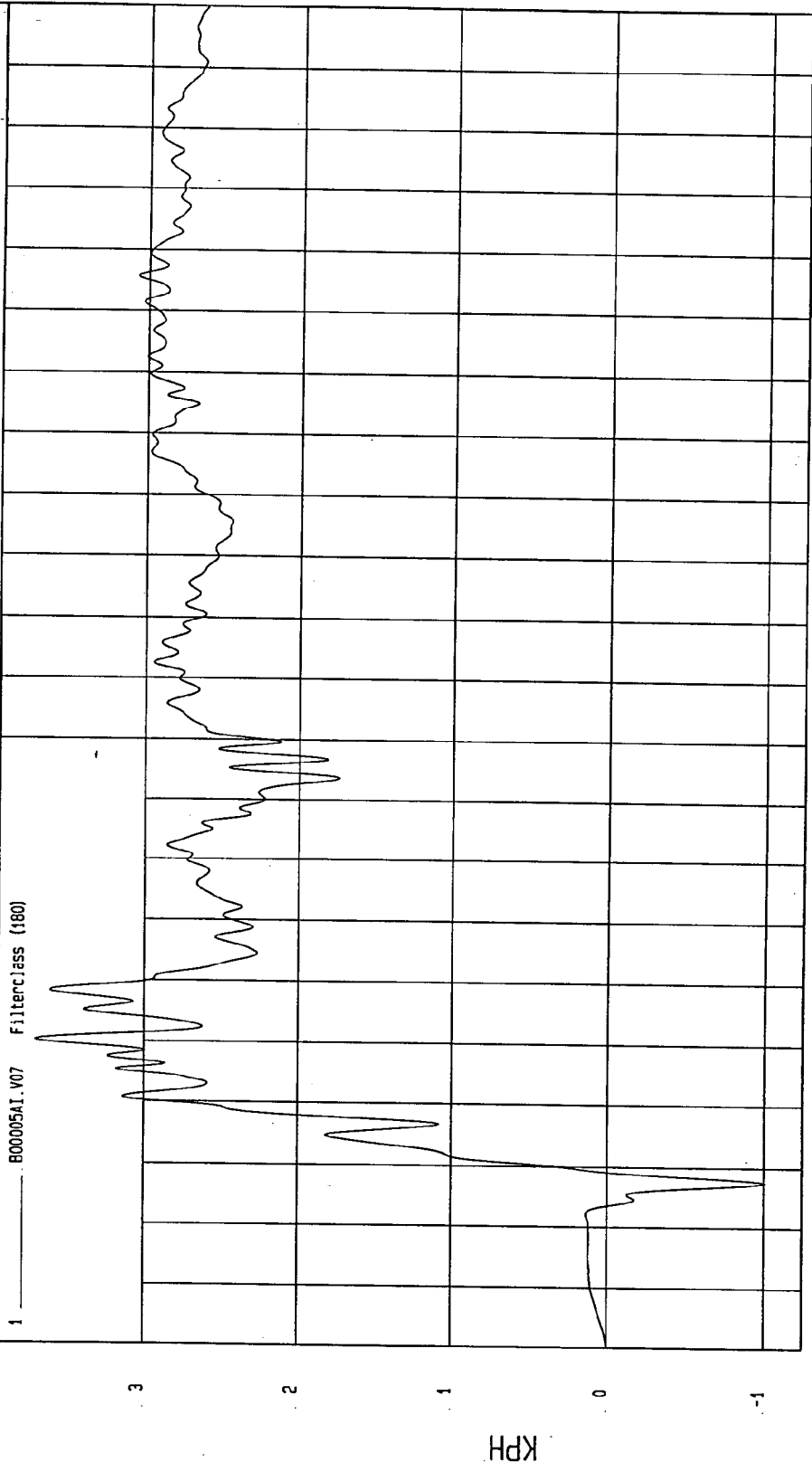


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -1.01 KPH at 7 msec Maximum = 3.7 KPH at 30 msec

VEHICLE CG Z VELOCITY



TIME Seconds

MGA Research
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TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

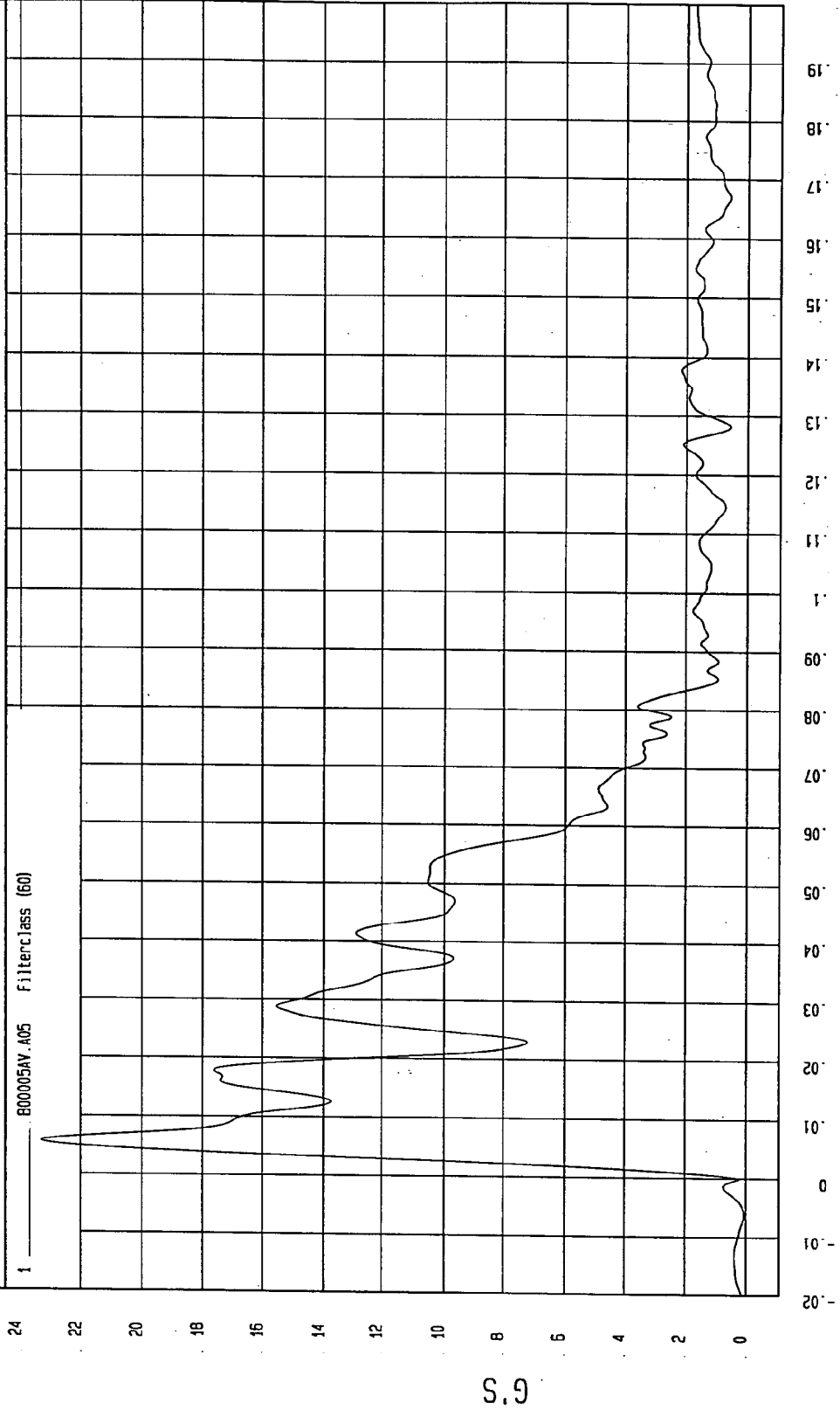
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 23.32 G'S at 5 msec

Minimum = 4.87E-02 G'S at -6 msec

VEHICLE CG RESULTANT ACCELERATION

1 800005AV.A05 Filterclass (60)



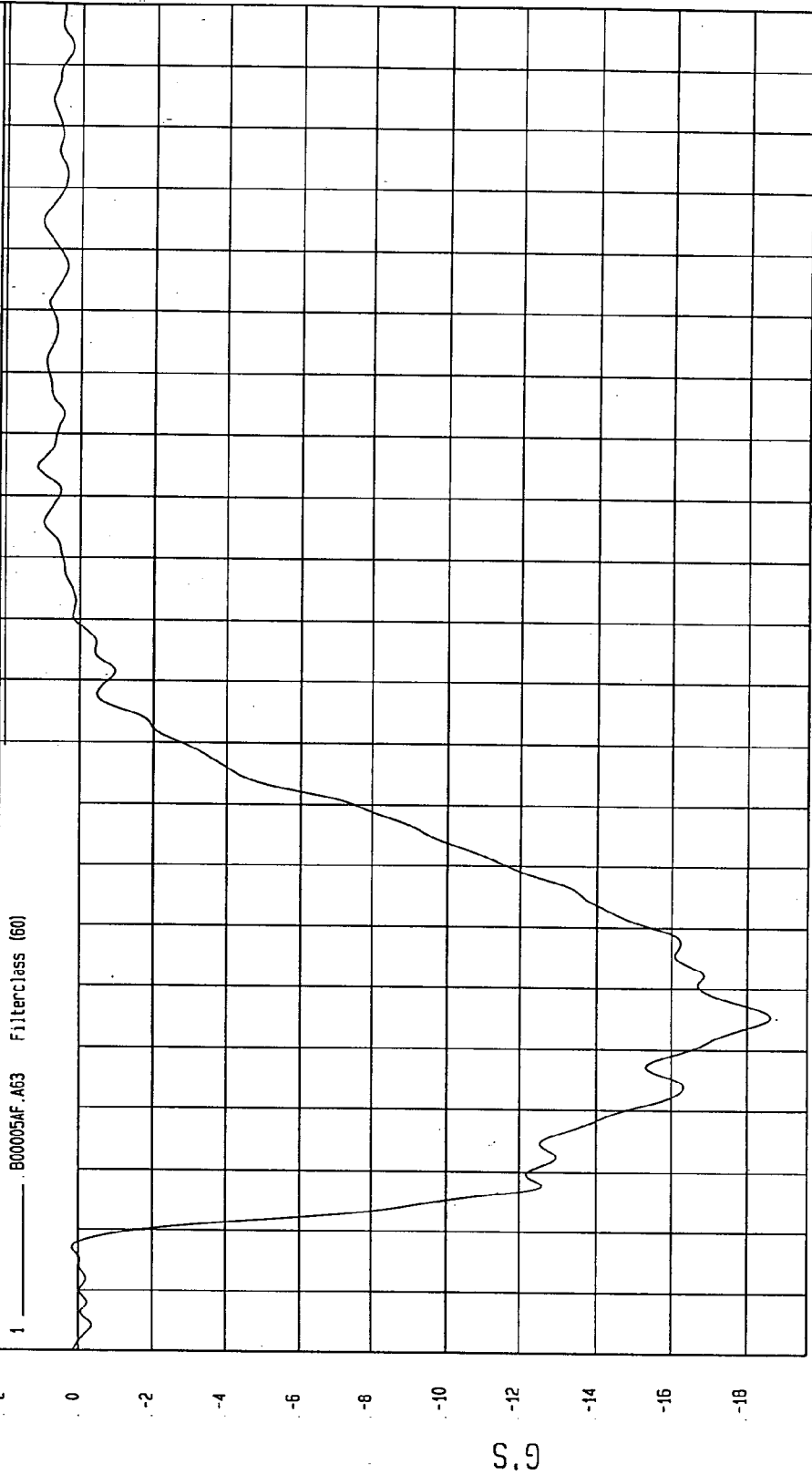
MOA Research
01-19-2000 14.49

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -18.63 G'S at 35 msec Maximum = 1.16 G'S at 125 msec

MOVING BARRIER CG X ACCELERATION



MOA Research
01-19-2000 14:49

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

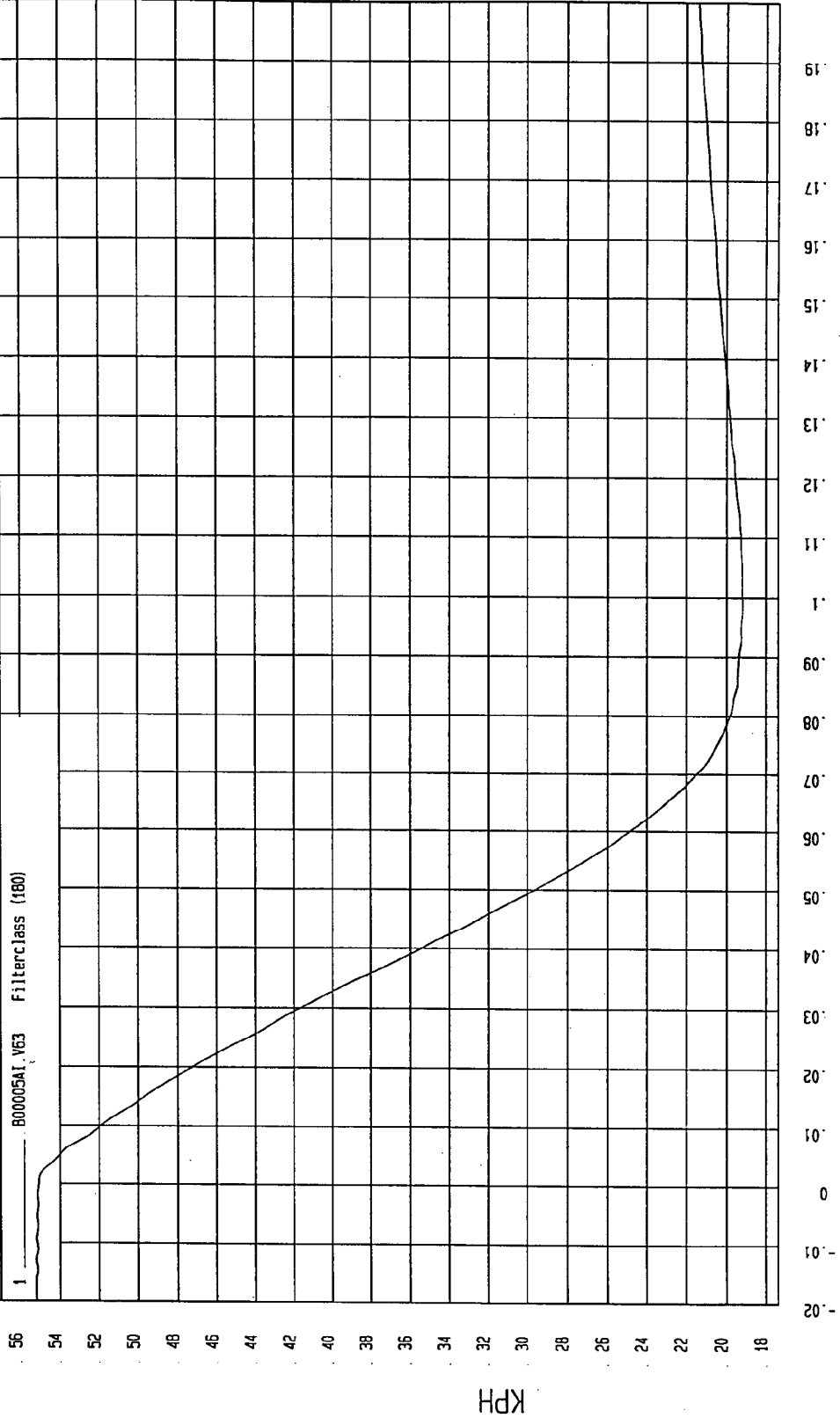
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 55.22 KPH at -17 msec

Minimum = 19.18 KPH at 99 msec

MOVING BARRIER CG X VELOCITY

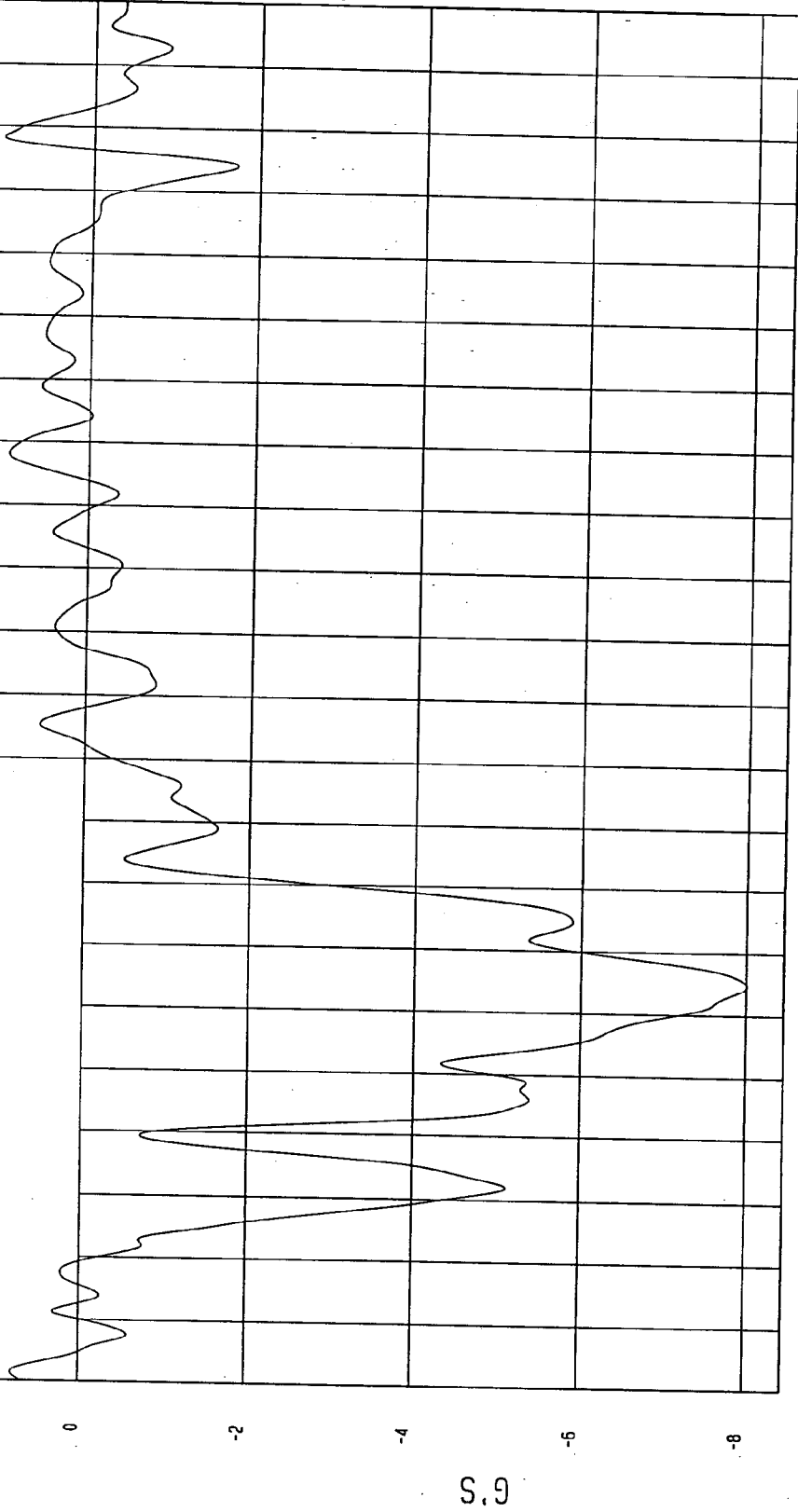


WCA Research
01-19-2000 14:49

TEST: FMVSS 214 INDICANT
 COMPONENT: 2000 TOYOTA AVALON (CY5102)
 TEST DATE: 01-19-2000
 Speed: 38.5 MPH 62 KPH
 Minimum = -8.01 G'S at 45 msec
 Maximum = 1.1 G'S at 178 msec

MOVING BARRIER CG Y ACCELERATION

1 ——— 800005AF .464 Filterclass (50)

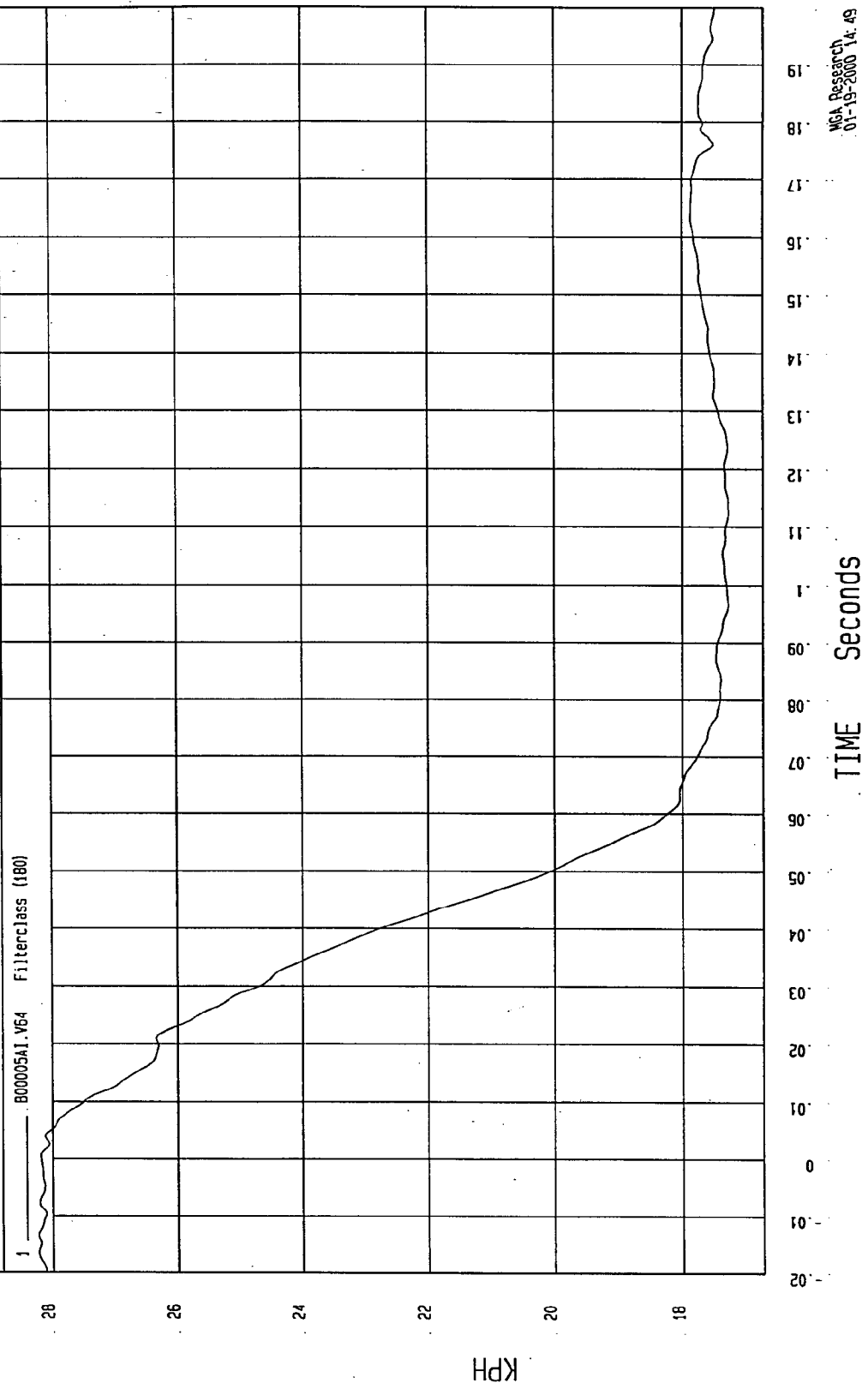


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = 17.27 KPH at 112 msec Maximum = 28.22 KPH at -14 msec

MOVING BARRIER CG Y VELOCITY



NCA Research
01-19-2000 14:49

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

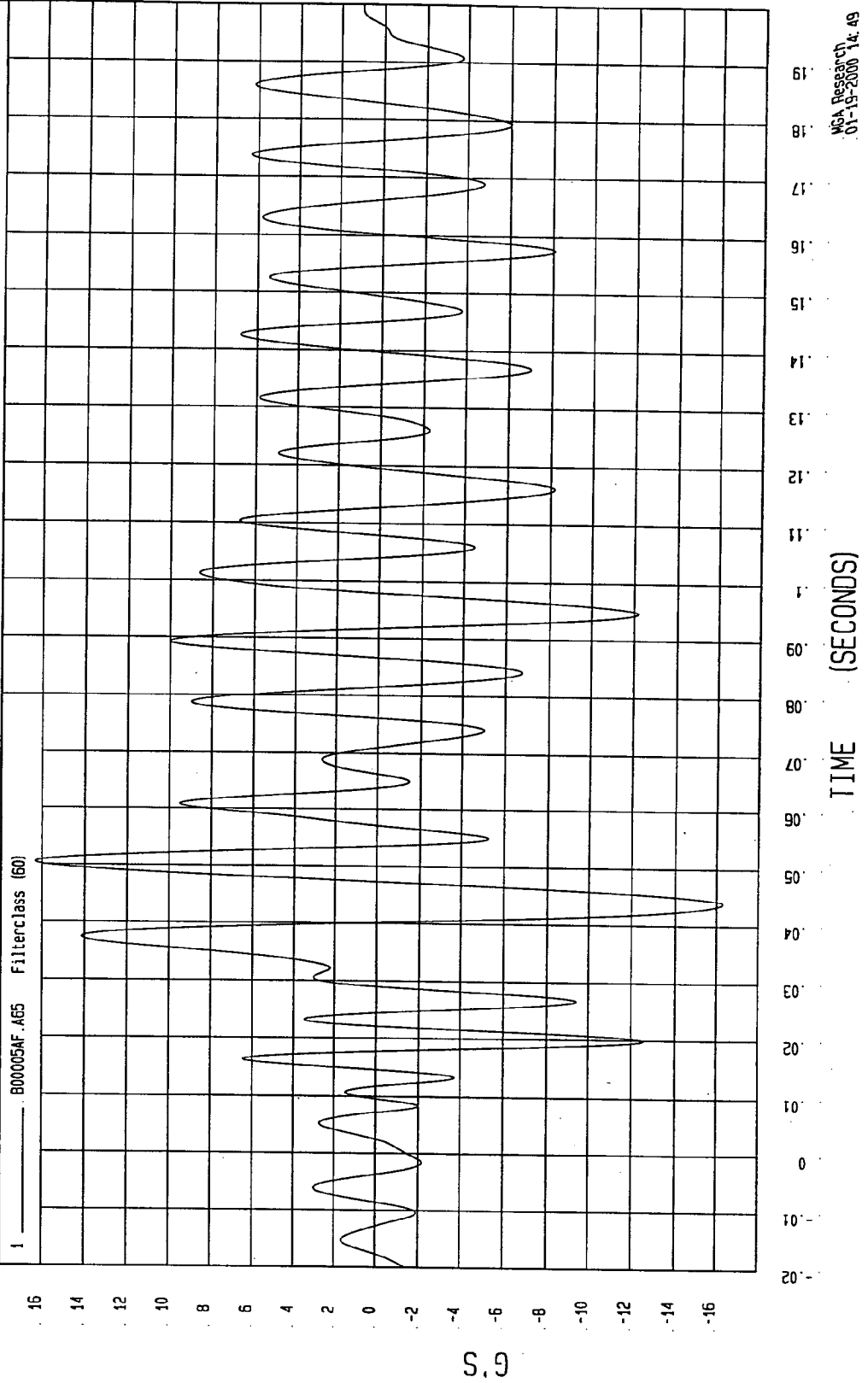
COMPONENT: 2000 TOYOTA AVALON (CY5102)

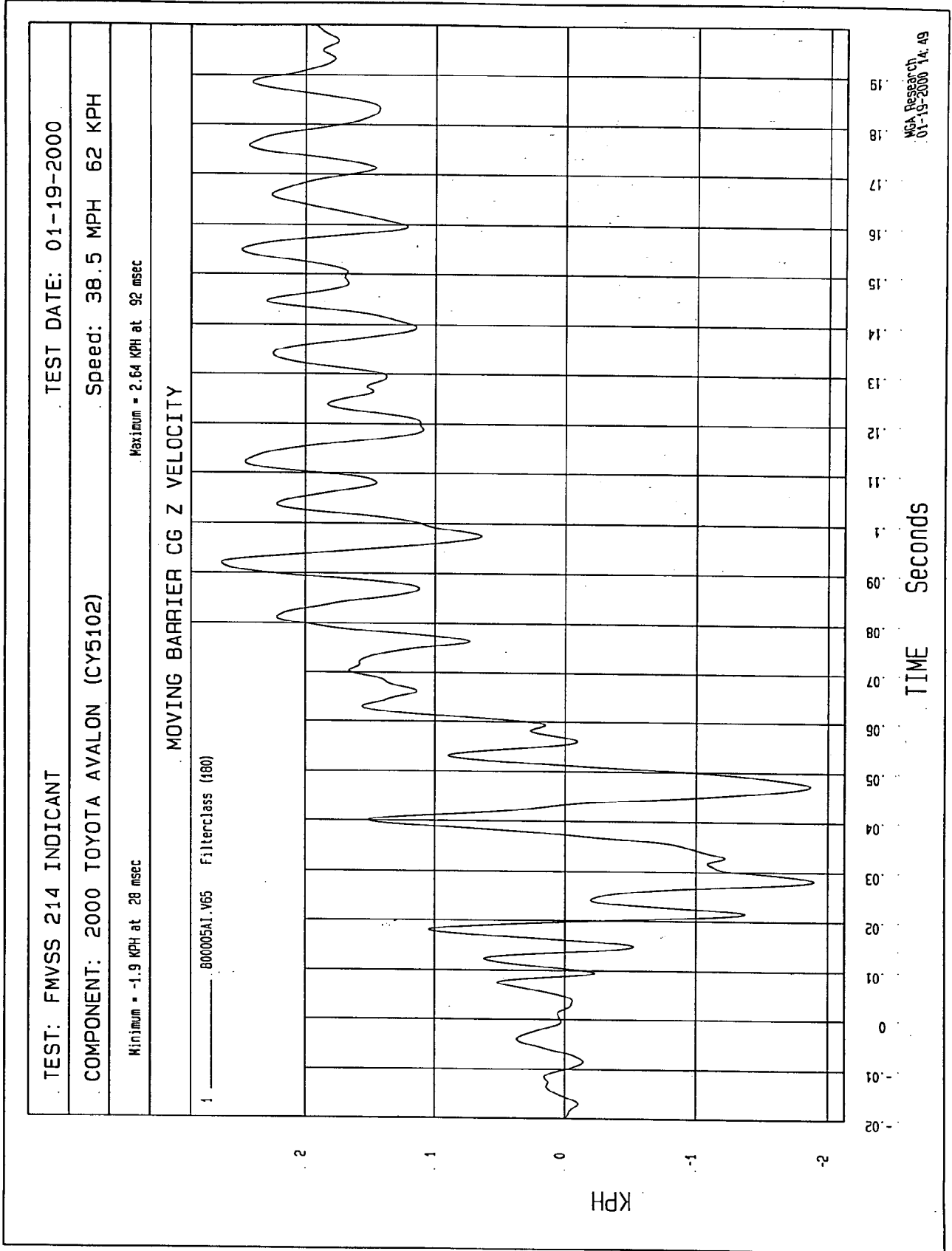
Speed: 38.5 MPH 62 KPH

Minimum = -15.31 G'S at 44 msec

Maximum = 16.31 G'S at 50 msec

MOVING BARRIER CG Z ACCELERATION



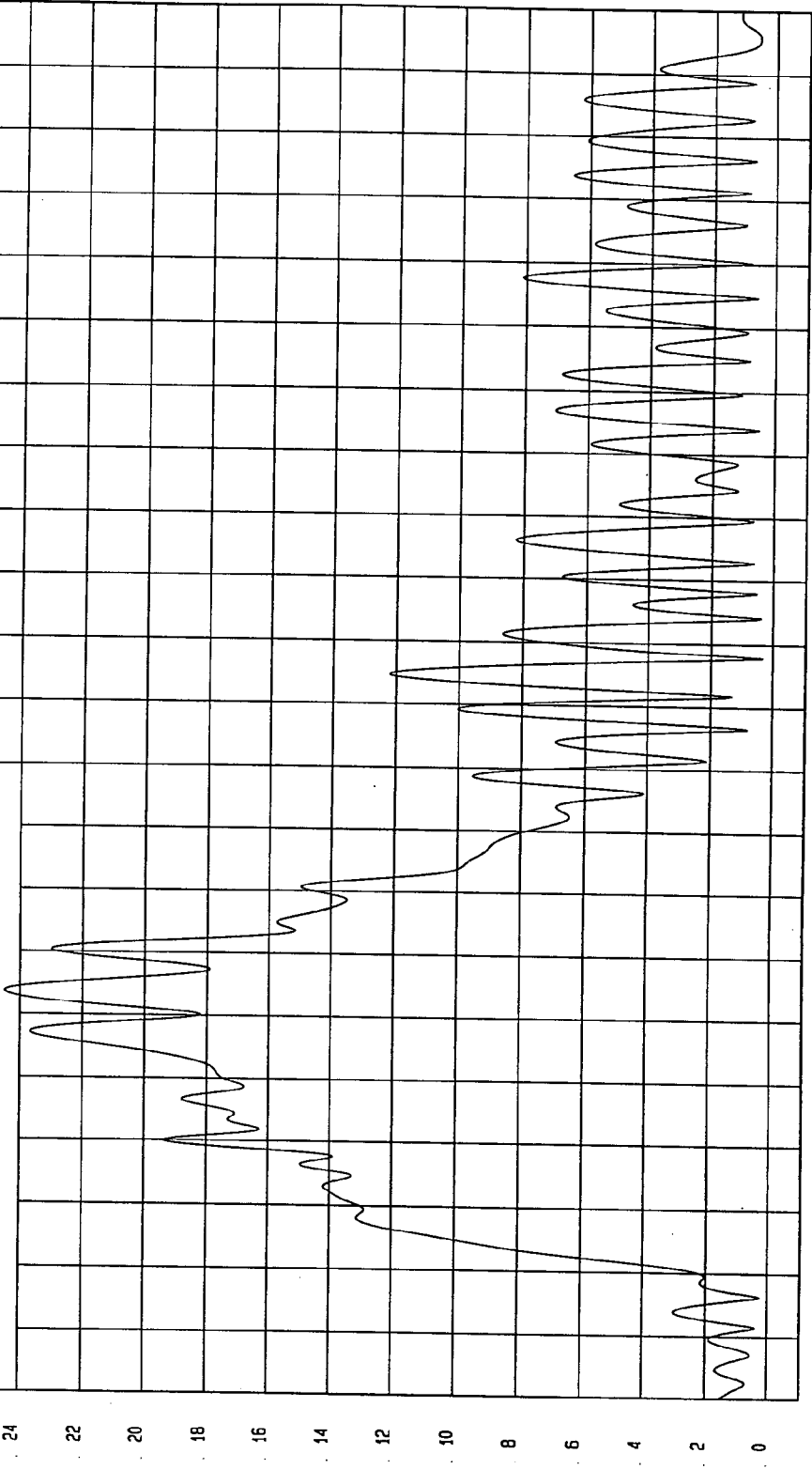


TEST: FMVSS 214 INDICANT
 COMPONENT: 2000 TOYOTA AVALON (CY5102)
 TEST DATE: 01-19-2000
 Speed: 38.5 MPH 62 KPH

Minimum = .18 G'S at ~4 msec
 Maximum = 24.48 G'S at 44 msec

MOVING BARRIER CG RESULTANT ACCELERATION

1 800005AV.A53 Filterclass (60)



WGA Research
 01-19-2000 14:49

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

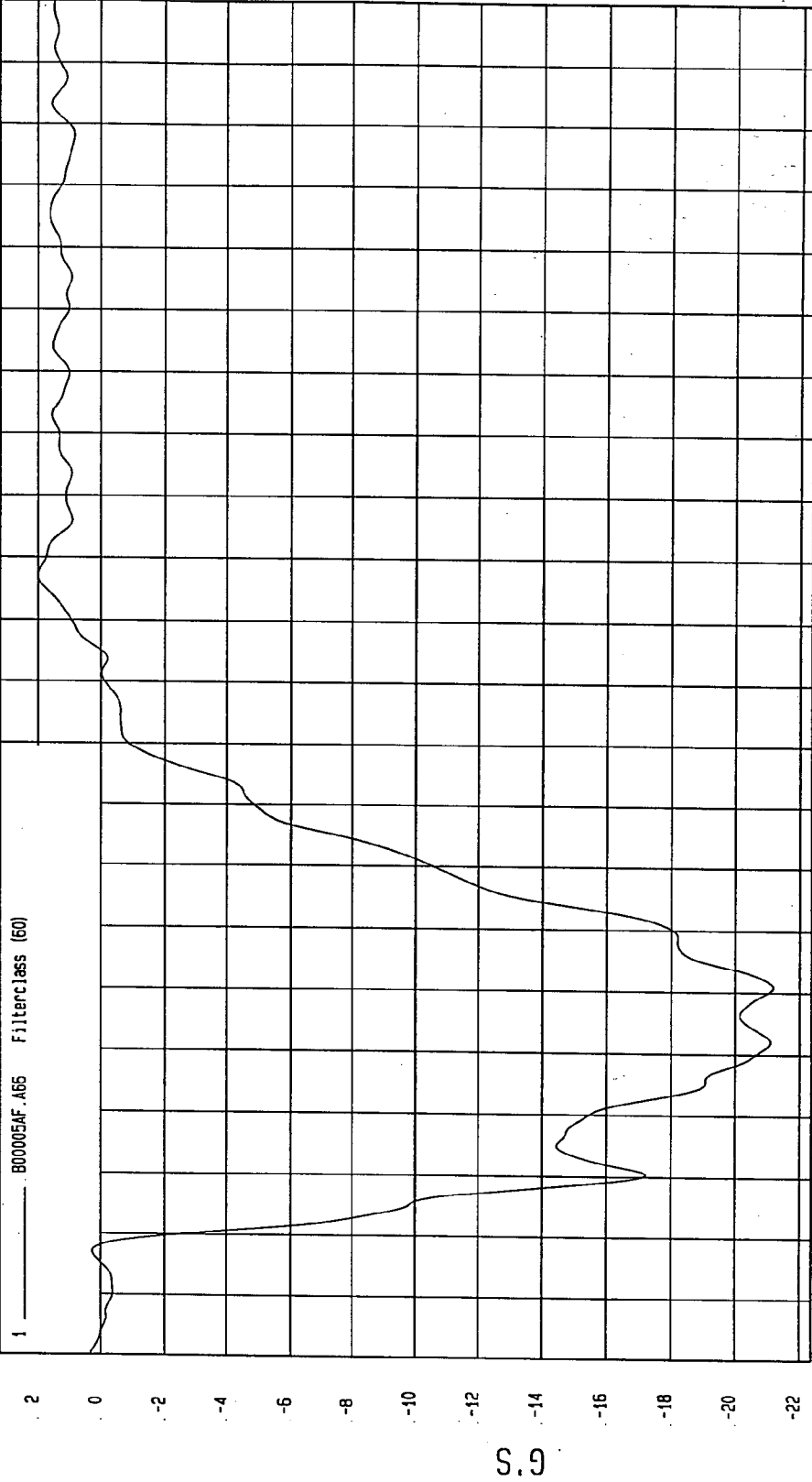
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 2.01 G'S at 107 msec

Minimum = -21.2 G'S at 41 msec

MOVING BARRIER REAR AXLE X ACCELERATION



MCA Research
01-19-2000 14:49

TIME (SECONDS)

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

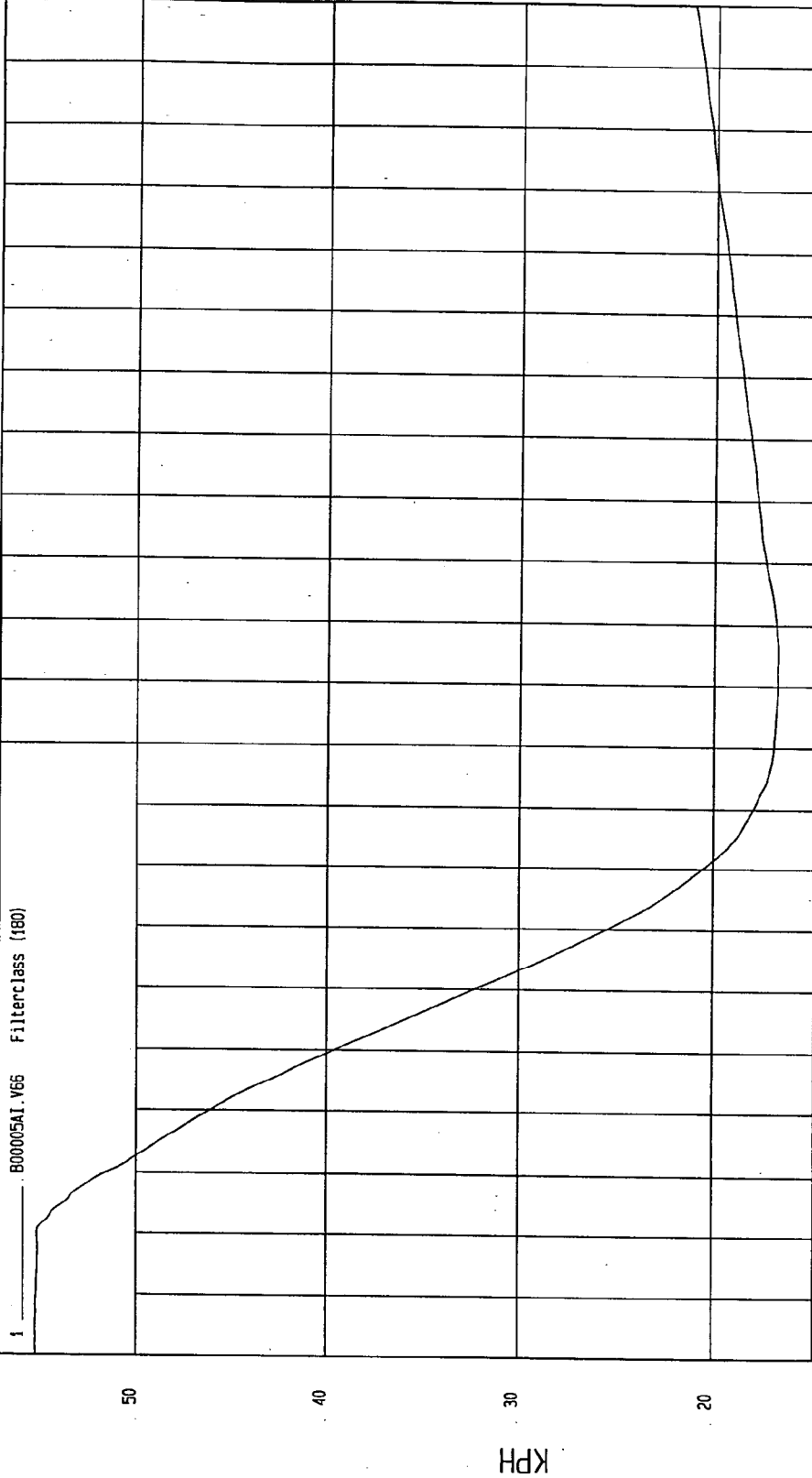
Speed: 38.5 MPH 62 KPH

Minimum = 16.56 KPH at 95 msec

Maximum = 55.22 KPH at -15 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 B00005A1.V65 Filterclass (180)



MGA Research
01-19-2000 14:49

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

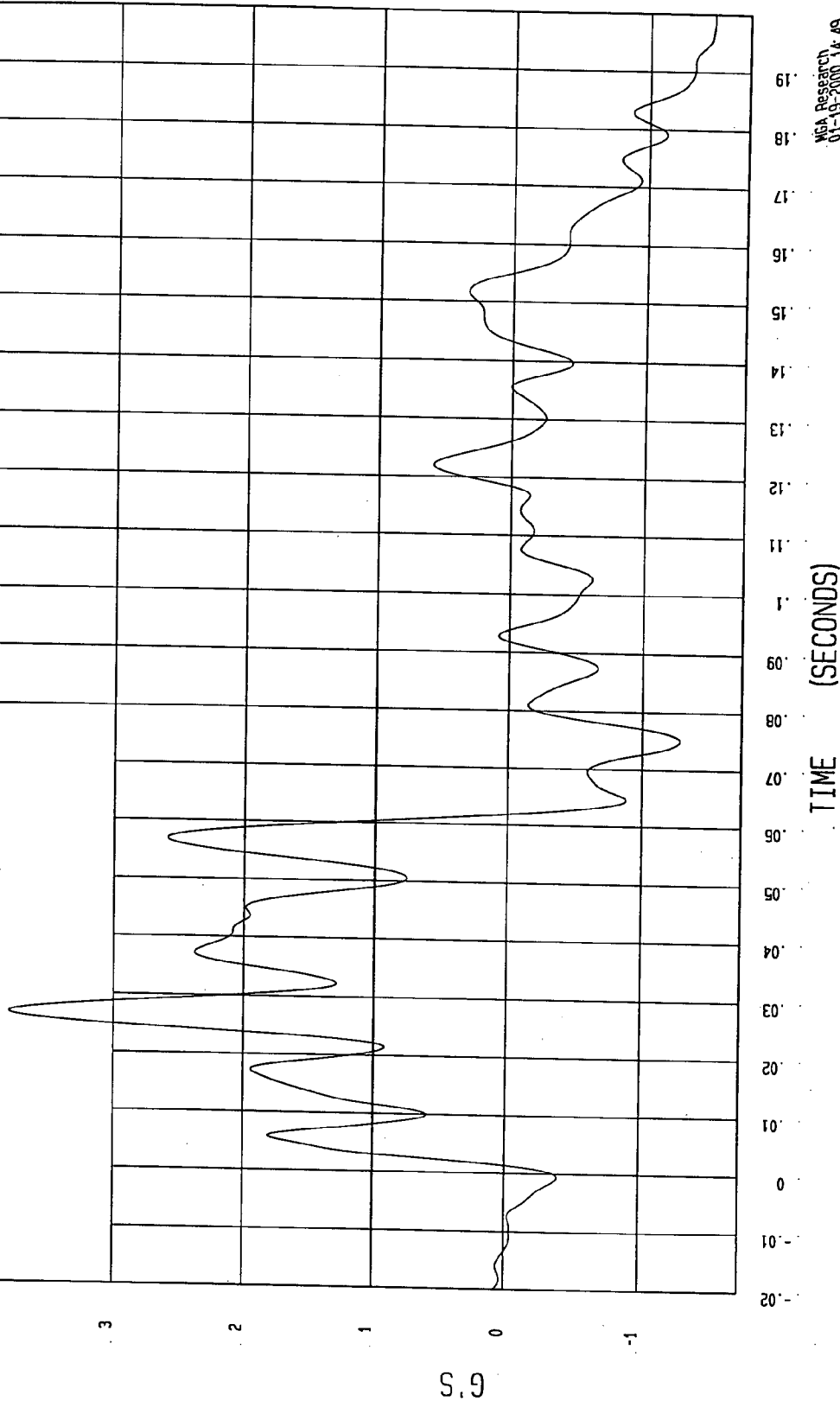
Speed: 38.5 MPH 62 KPH

Minimum = -1.49 G'S at 199 msec

Maximum = 3.8 G'S at 27 msec

MOVING BARRIER REAR AXLE Y ACCELERATION

1 B00005AF.A67 Filterclass (60)

WCA Research
01-19-2000 14:49

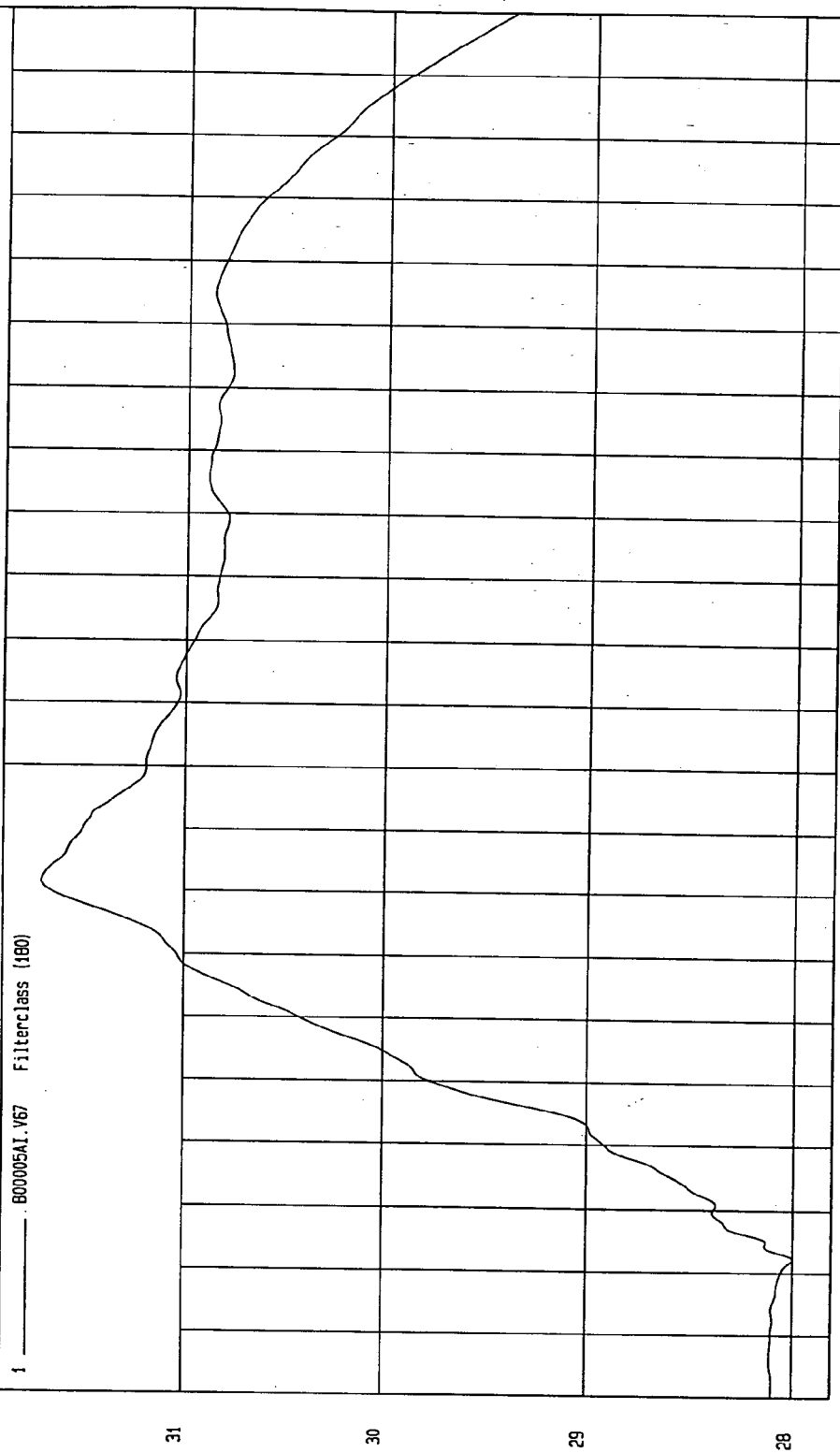
TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = 28 KPH at 2 msec Maximum = 31.7 KPH at 62 msec

MOVING BARRIER REAR AXLE Y VELOCITY

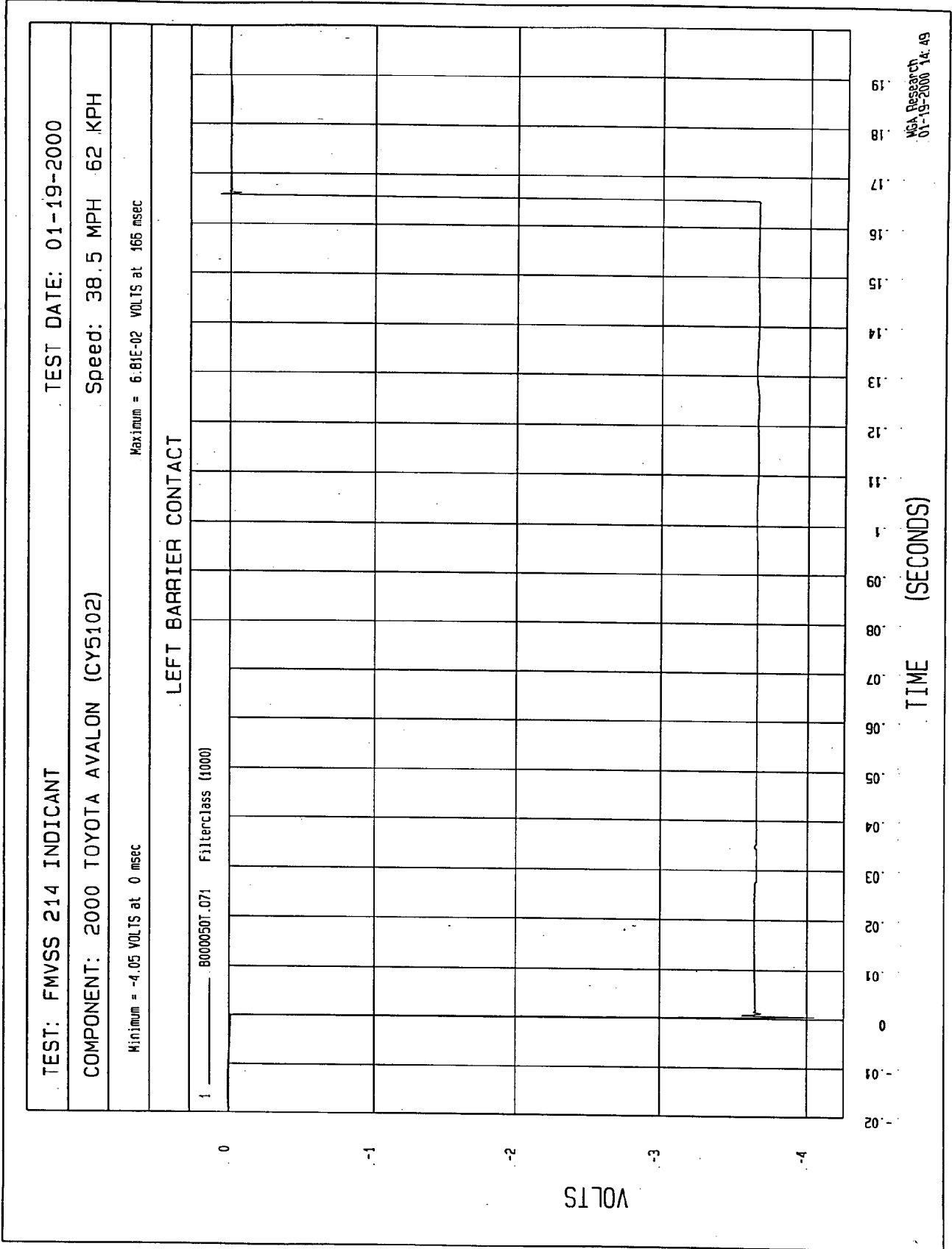
1 B00005A1.V67 Filterclass (180)



WGA Research
01-19-2000 14:49

TIME Seconds

KPH



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

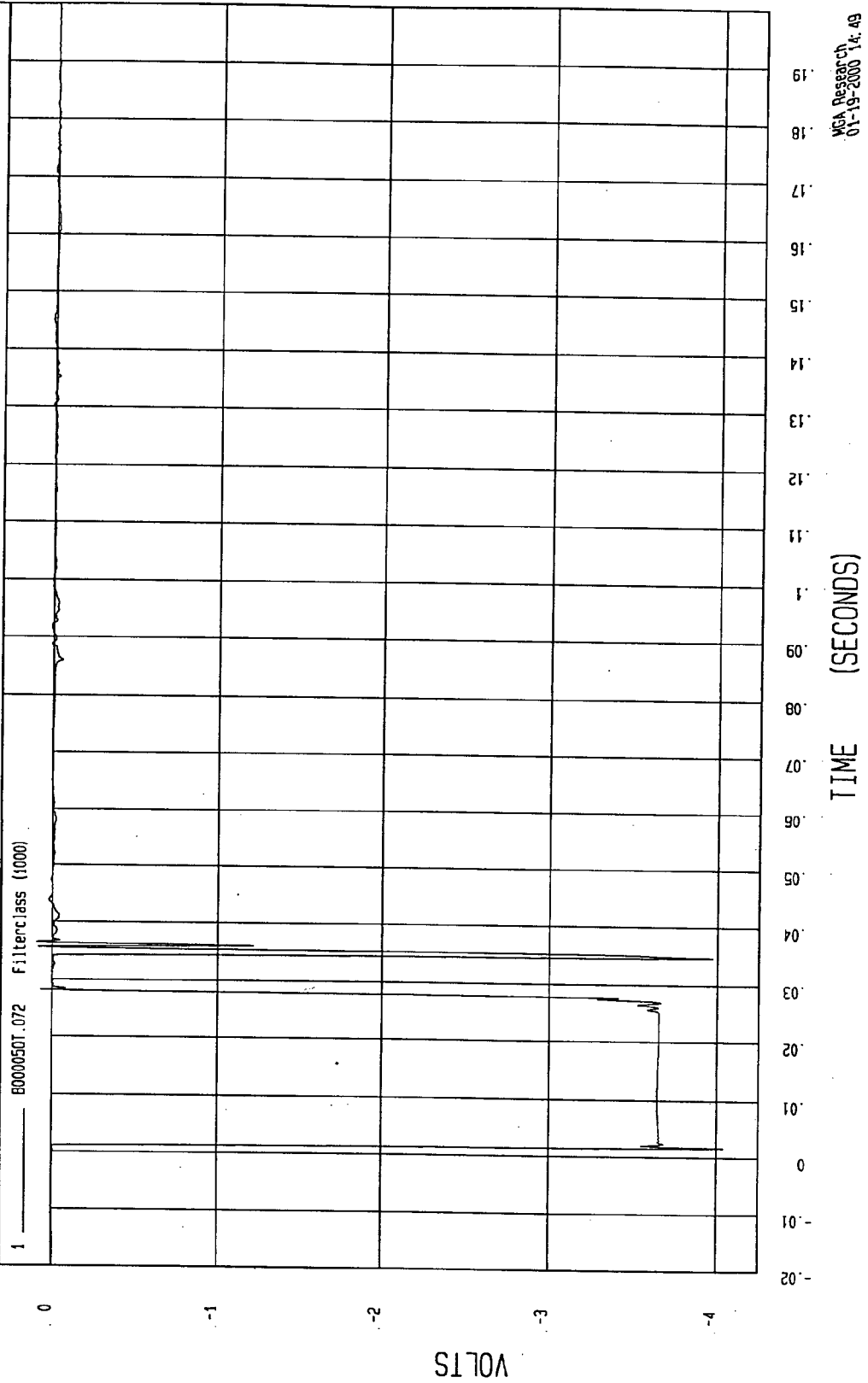
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -4.04 VOLTS at 2 msec

Maximum = 9.03E-02 VOLTS at 36 msec

RIGHT BARRIER CONTACT

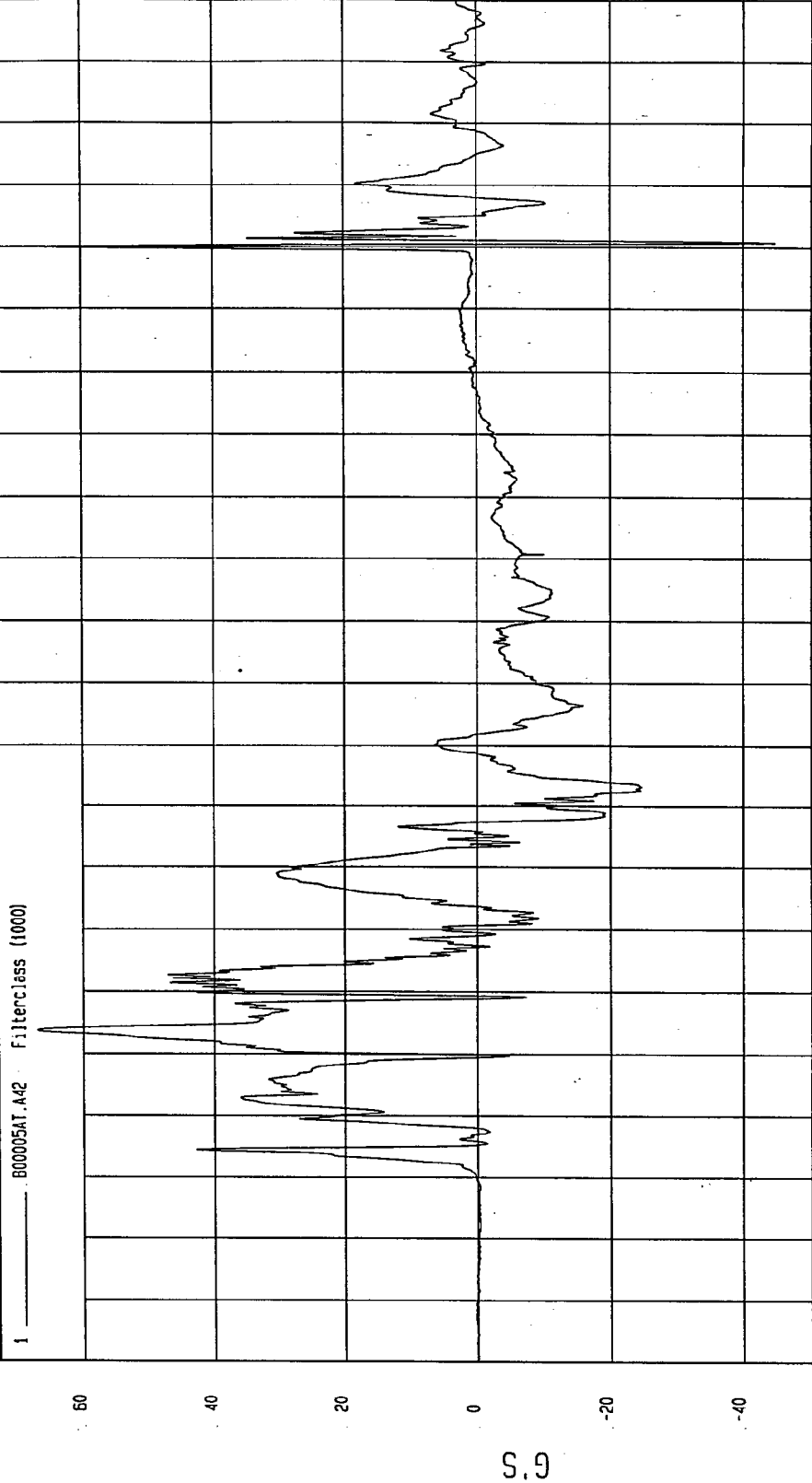


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -44.94 G'S at 161 msec Maximum = 67.08 G'S at 34 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



TIME (SECONDS)

MSA Research
01-19-2000 14:51

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

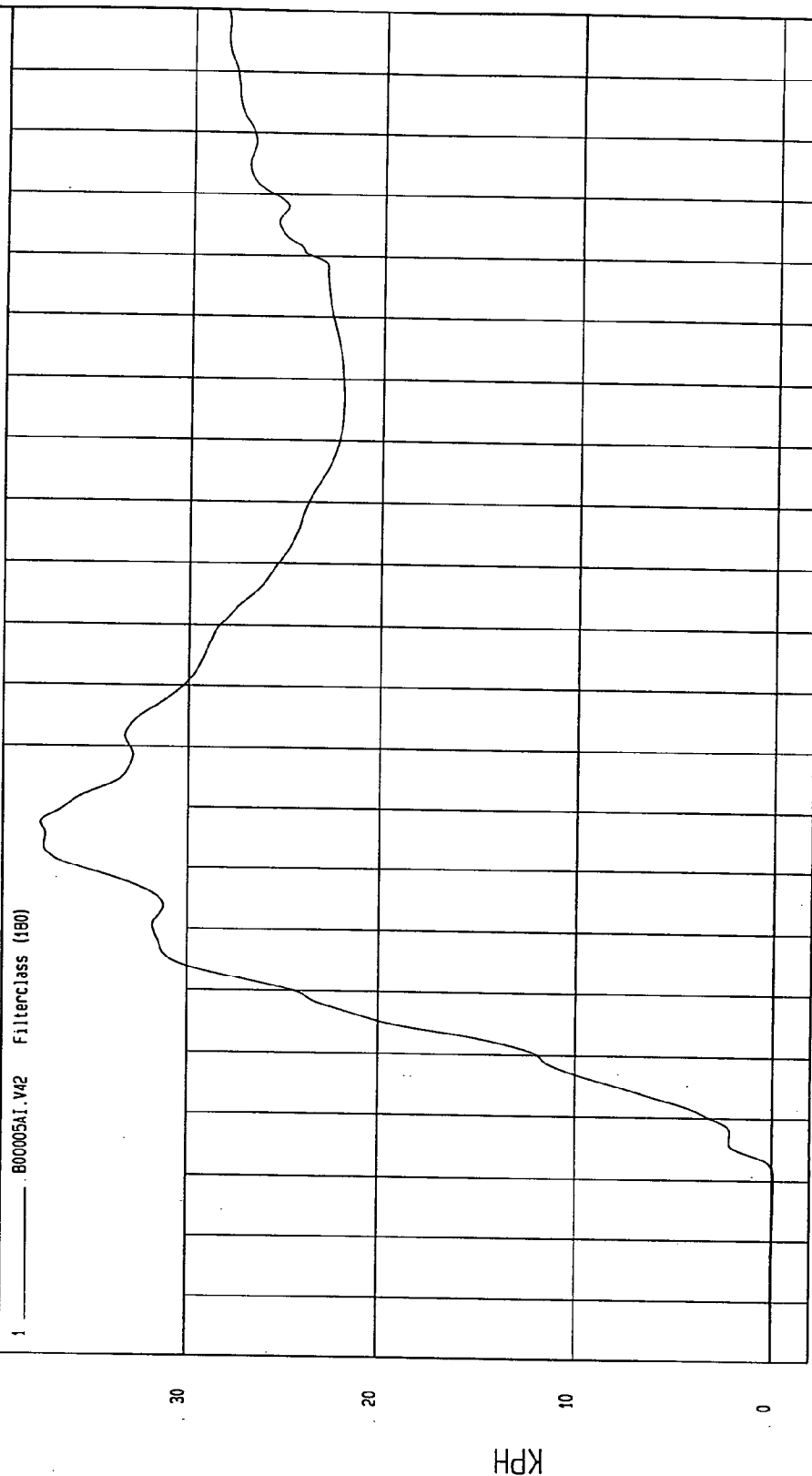
Speed: 38.5 MPH 62 KPH

Minimum = -6.94E-02 KPH at 9 msec

Maximum = 37.6 KPH at 67 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY

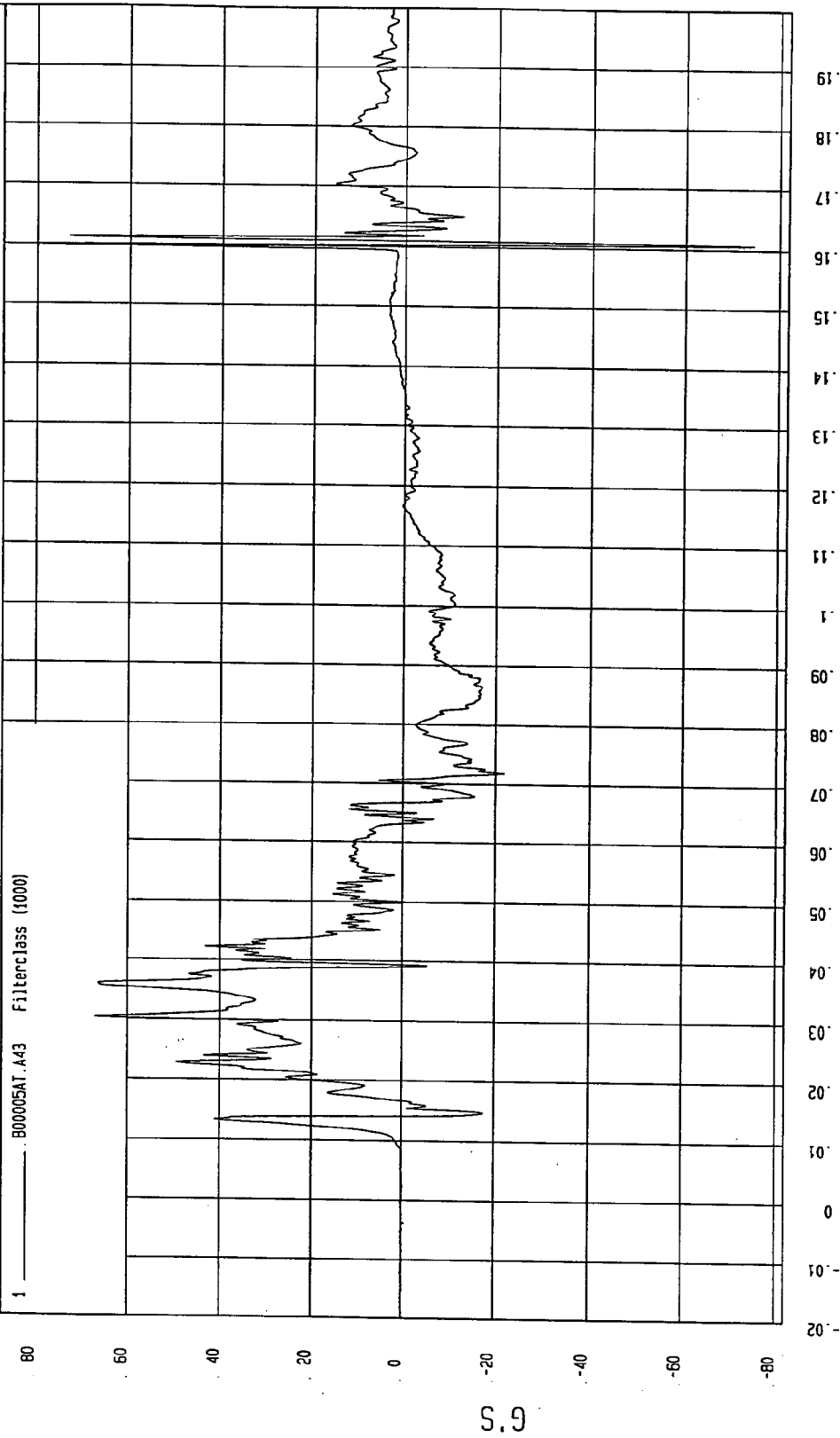
1 ——— B00005A1.V42 Filterclass (180)

MGA Research
01-19-2000 14:51

TIME Seconds

TEST: FMVSS 214 INDICANT
 COMPONENT: 2000 TOYOTA AVALON (CY5102)
 Minimum = -74.34 G'S at 161 msec
 Maximum = 79.39 G'S at 160 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION



NSA Research
 01-19-2000 14:51

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

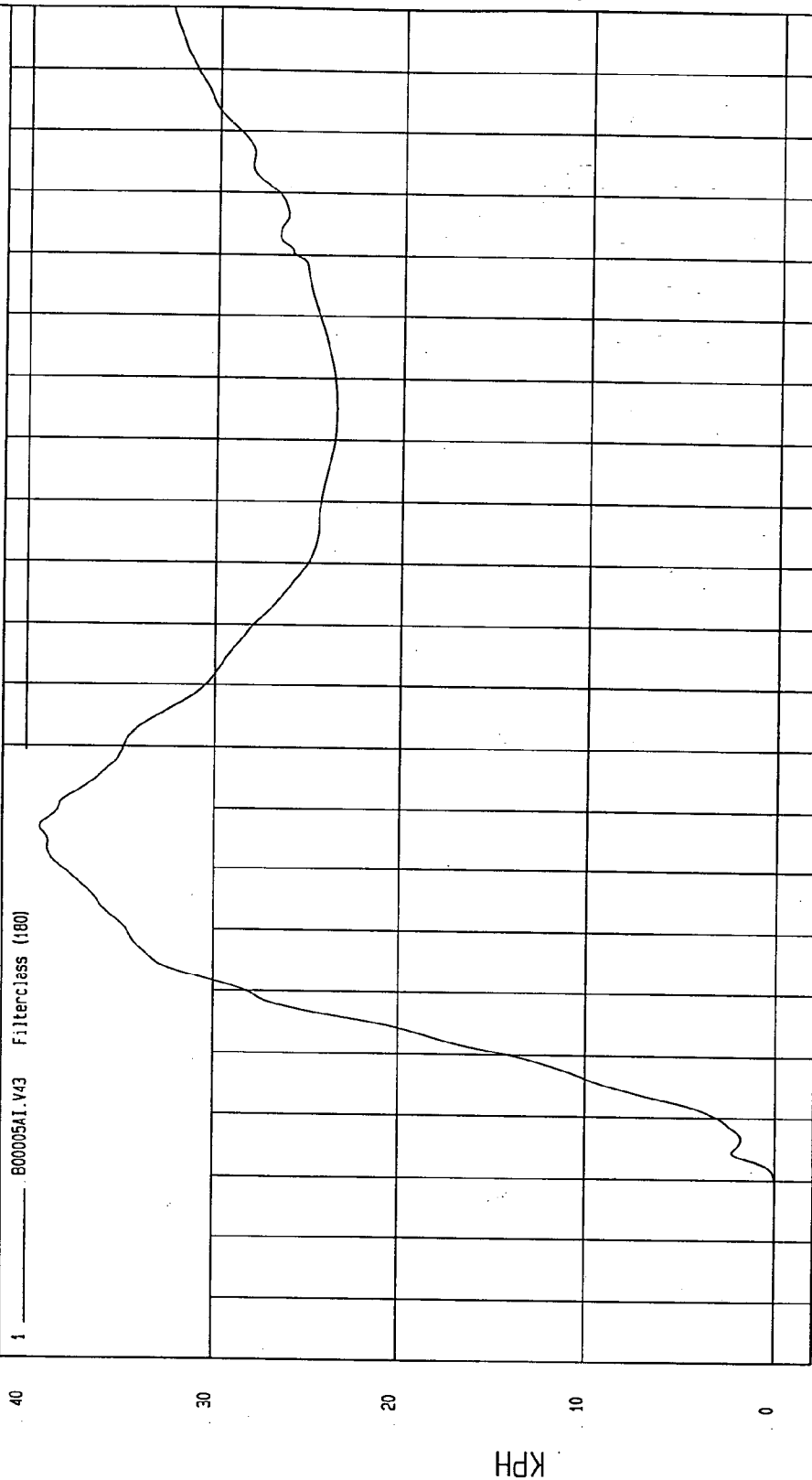
Speed: 38.5 MPH 62 KPH

Minimum = -4.64E-03 KPH at 4 msec

Maximum = 39.27 KPH at 67 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY

1 ——— 800005A1.V43 Filterclass (180)

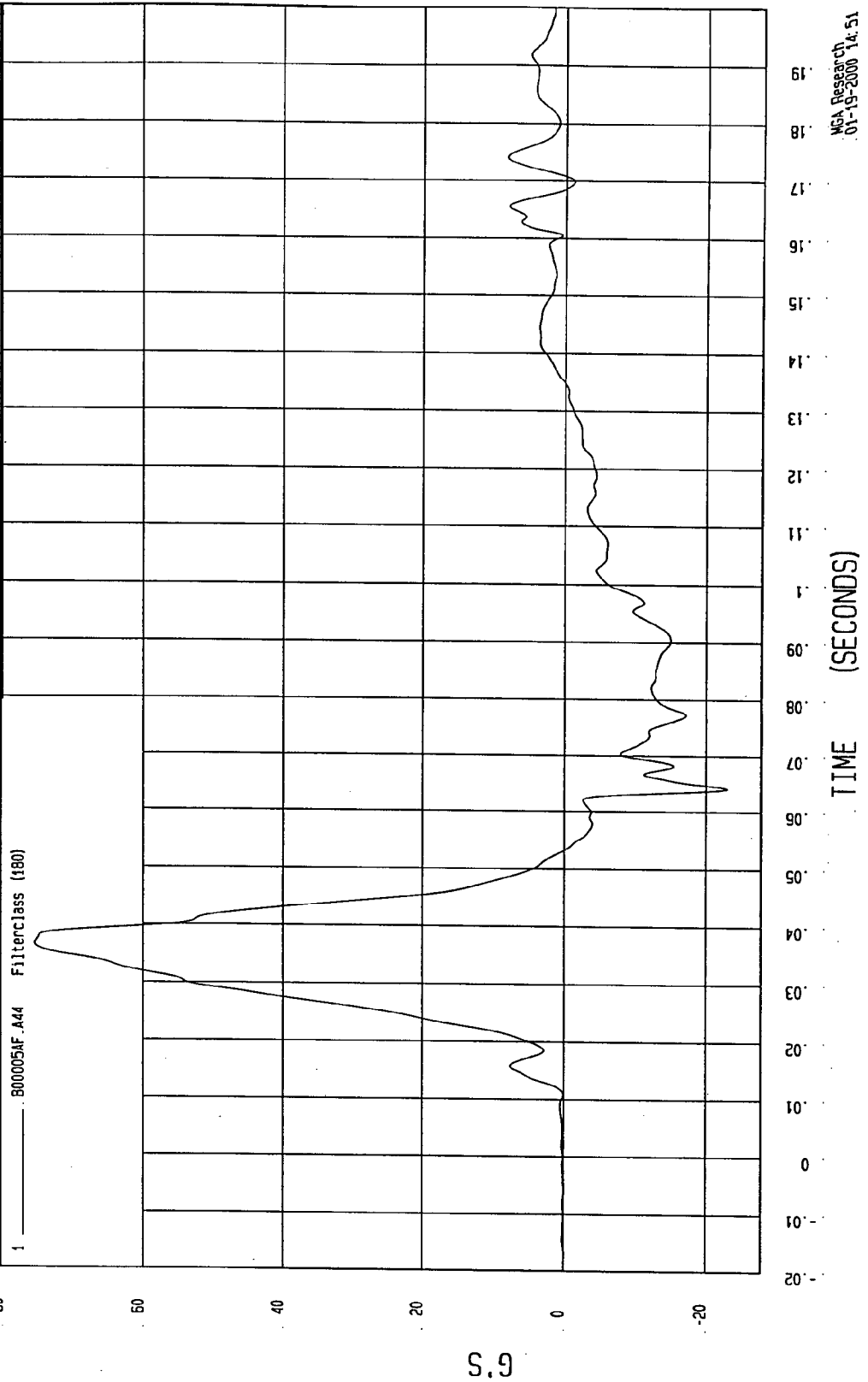
MGA Research
01-19-2000 14:51TIME
Seconds

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -23.07 G's at 64 msec Maximum = 75.36 G's at 36 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION



NGA Research
01-19-2000 14.51

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

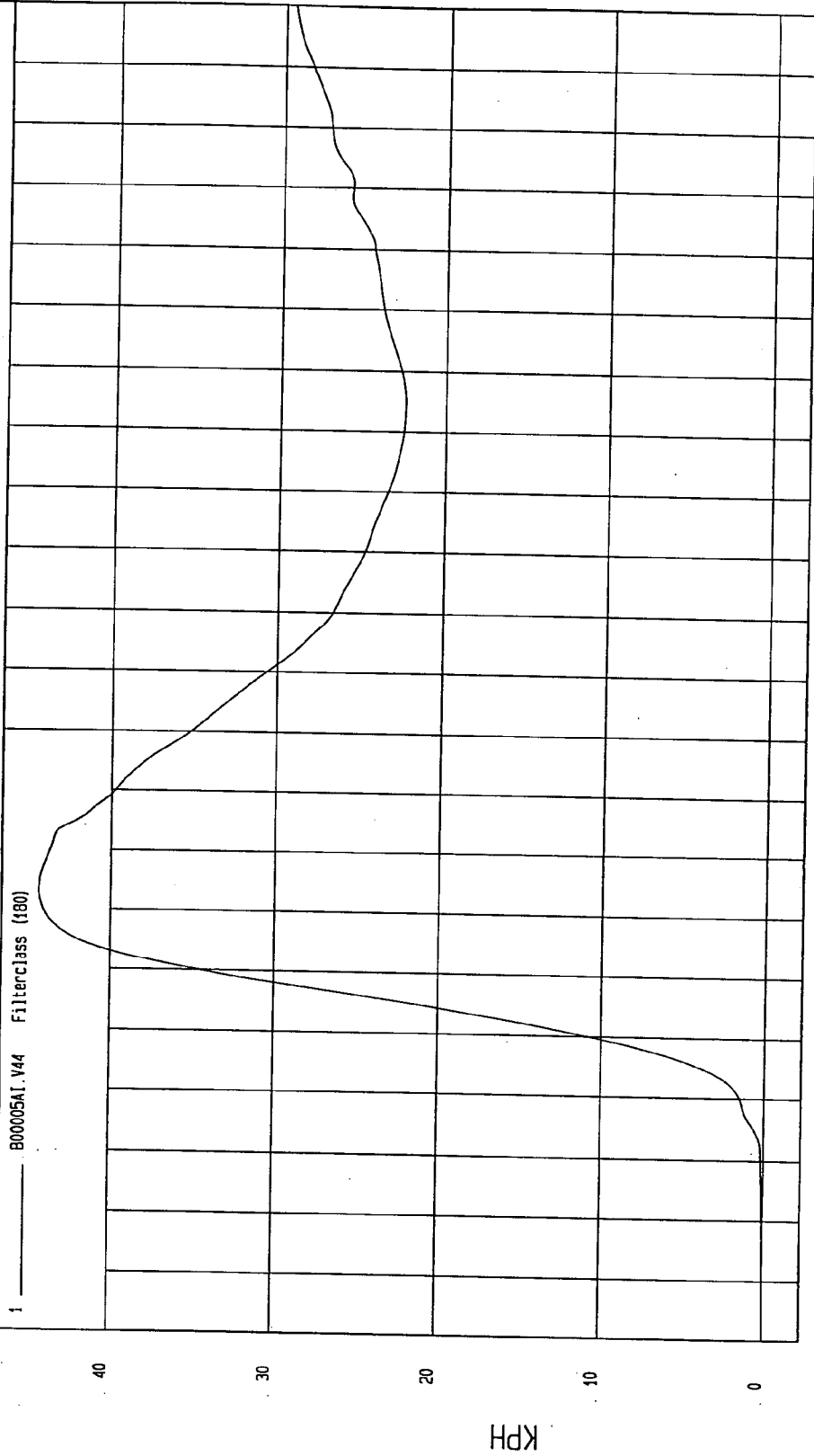
Speed: 38.5 MPH 62 KPH

Minimum = 0 KPH at -20 msec

Maximum = 44.39 KPH at 53 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— B00005A1.V44 Filterclass (180)



TIME Seconds

WBA Research
01-19-2000 14:51

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

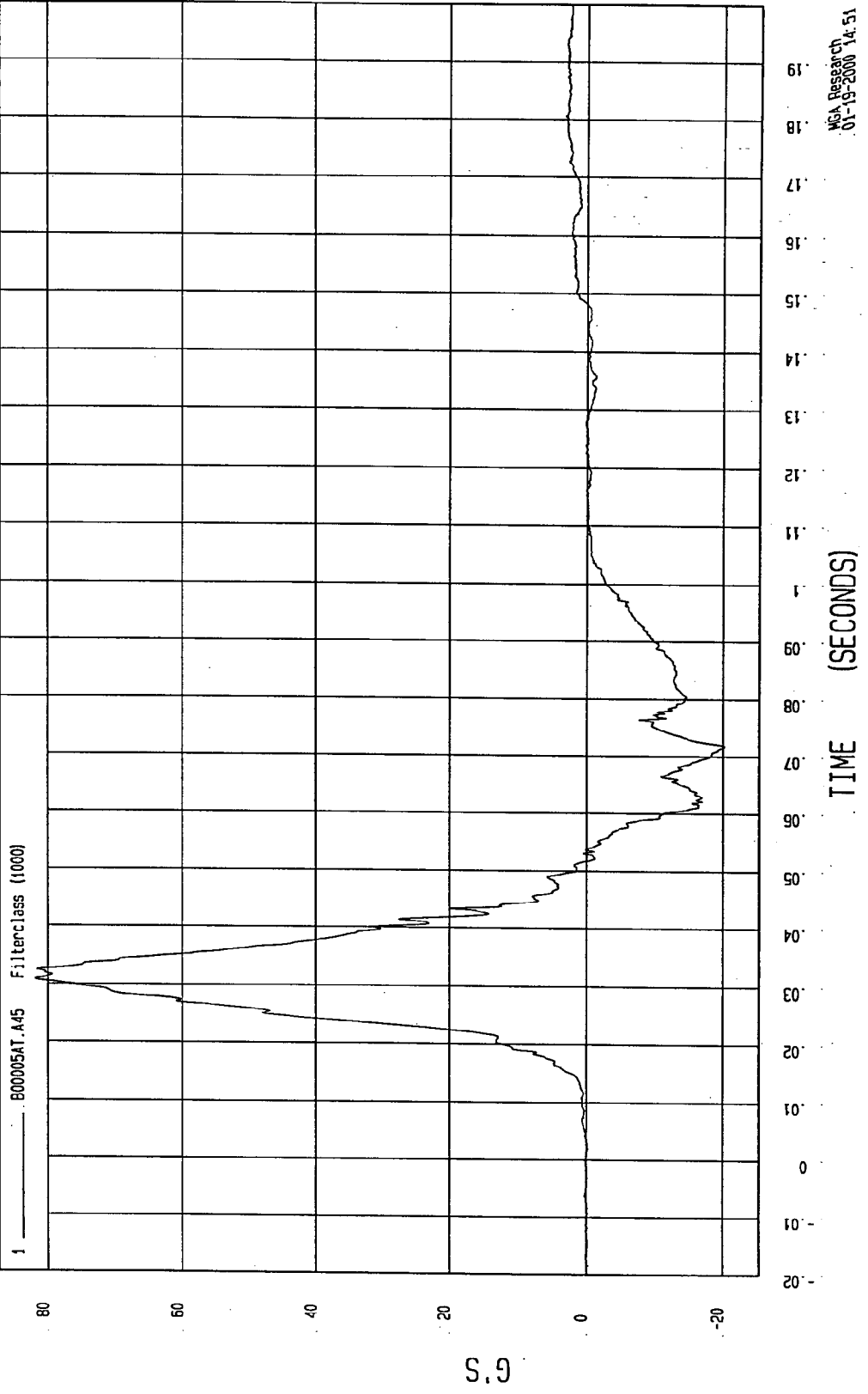
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 81.93 G'S at 31 msec

Minimum = -20.22 G'S at 72 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

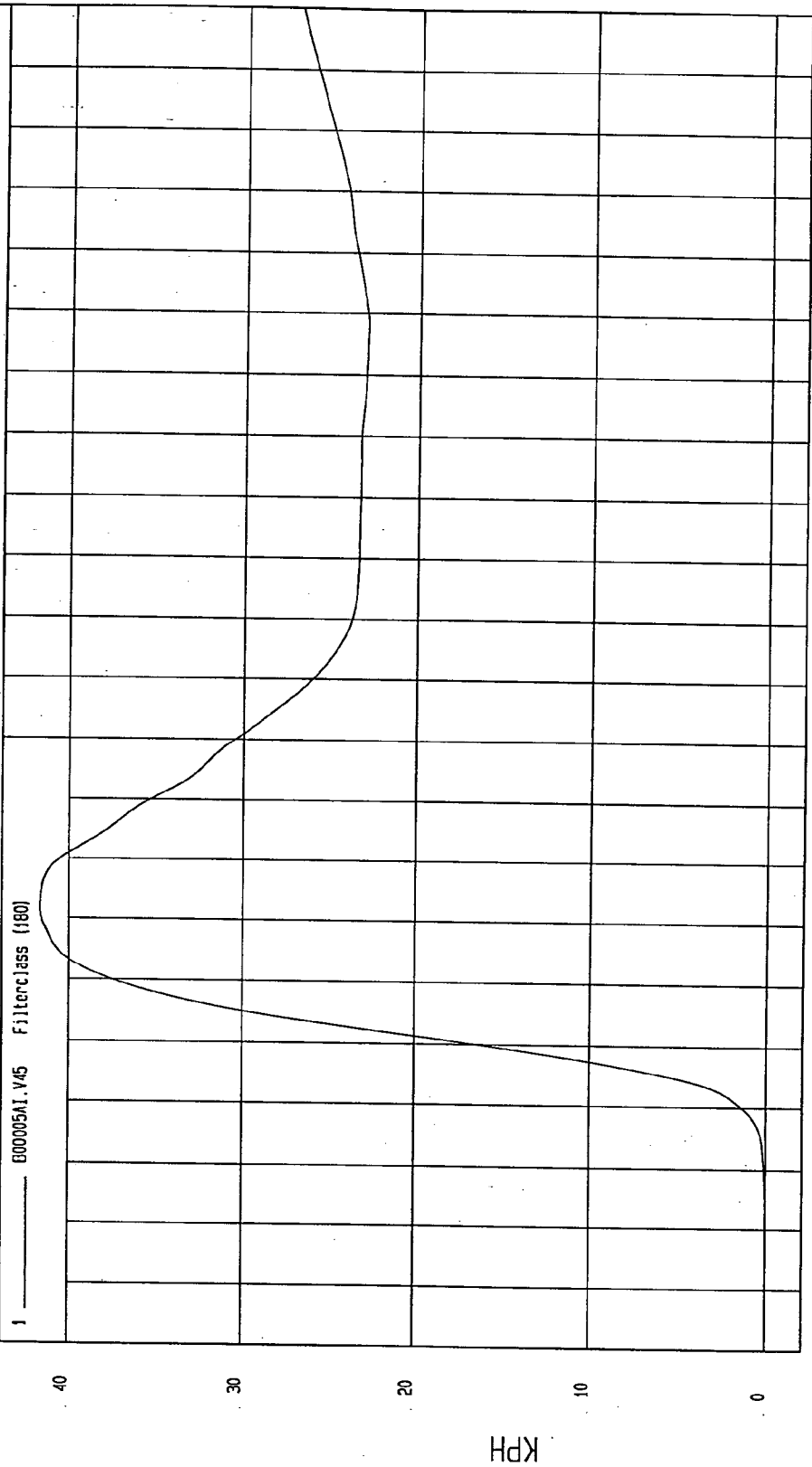


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -7.80E-03 KPH at -8 msec Maximum = 41.61 KPH at 52 msec

DRIVER PELVIS Y REDUNDANT VELOCITY



MSA Research
01-19-2000 14:51

TIME Seconds

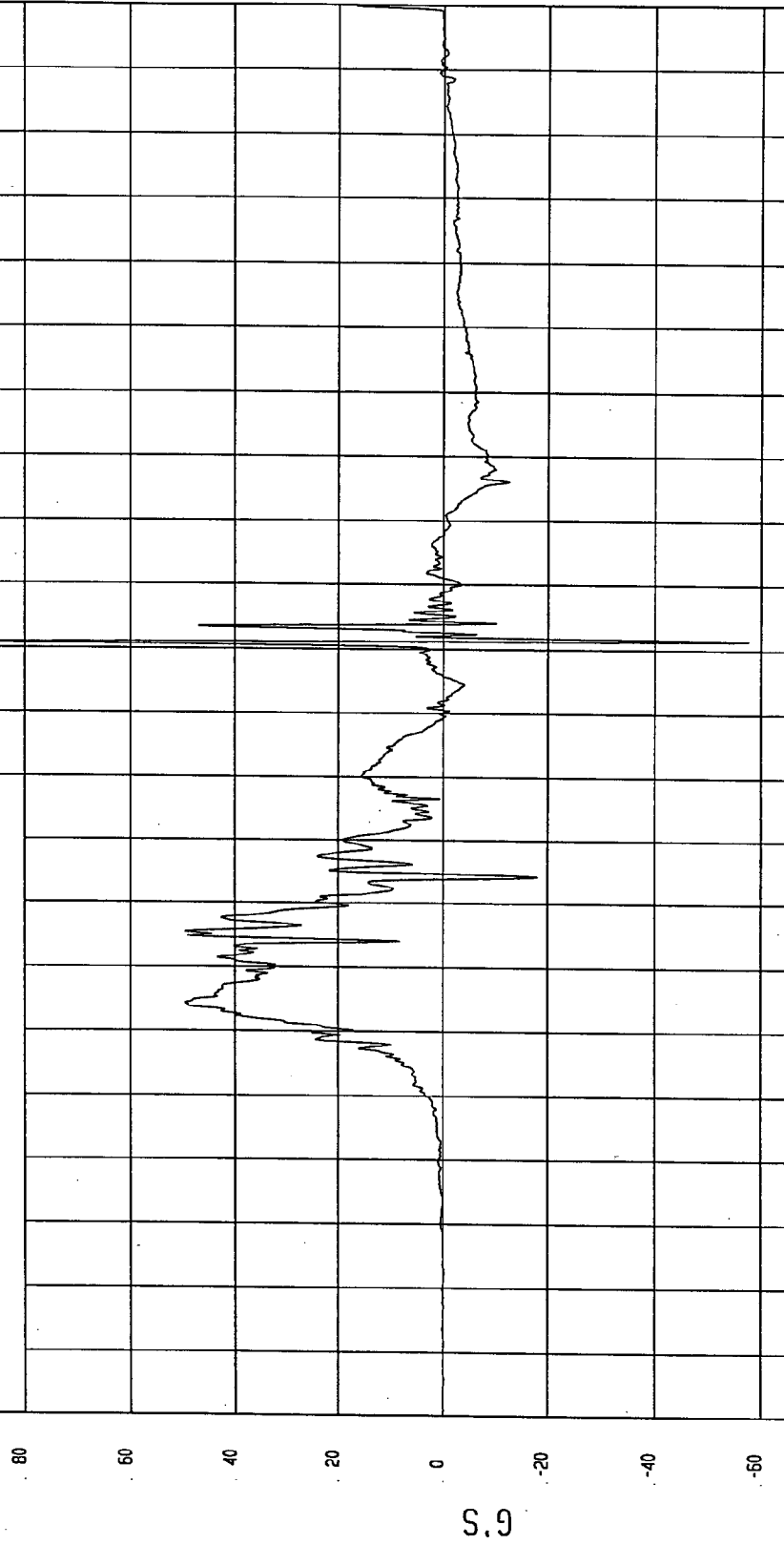
KPH

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -57.64 G'S at 101 msec Maximum = 87.65 G'S at 101 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 _____ BC0005A1.A46 Filterclass (1000)



MSA Research
01-19-2000 14:52

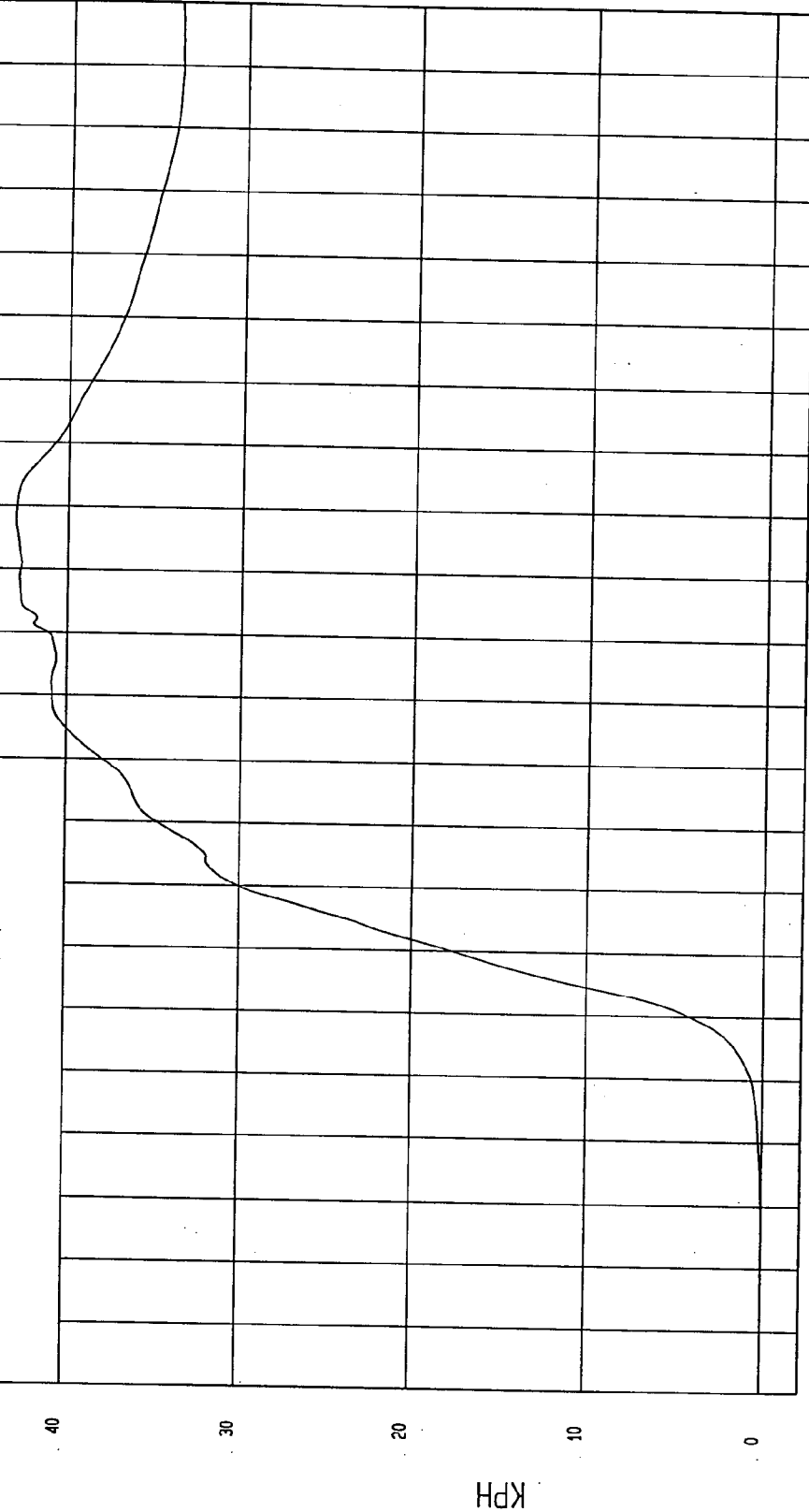
TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -6.01E-03 KPH at -8 msec Maximum = 42.92 KPH at 118 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY

1 B00005A1.V46 Filterclass (180)



TIME Seconds

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.1 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

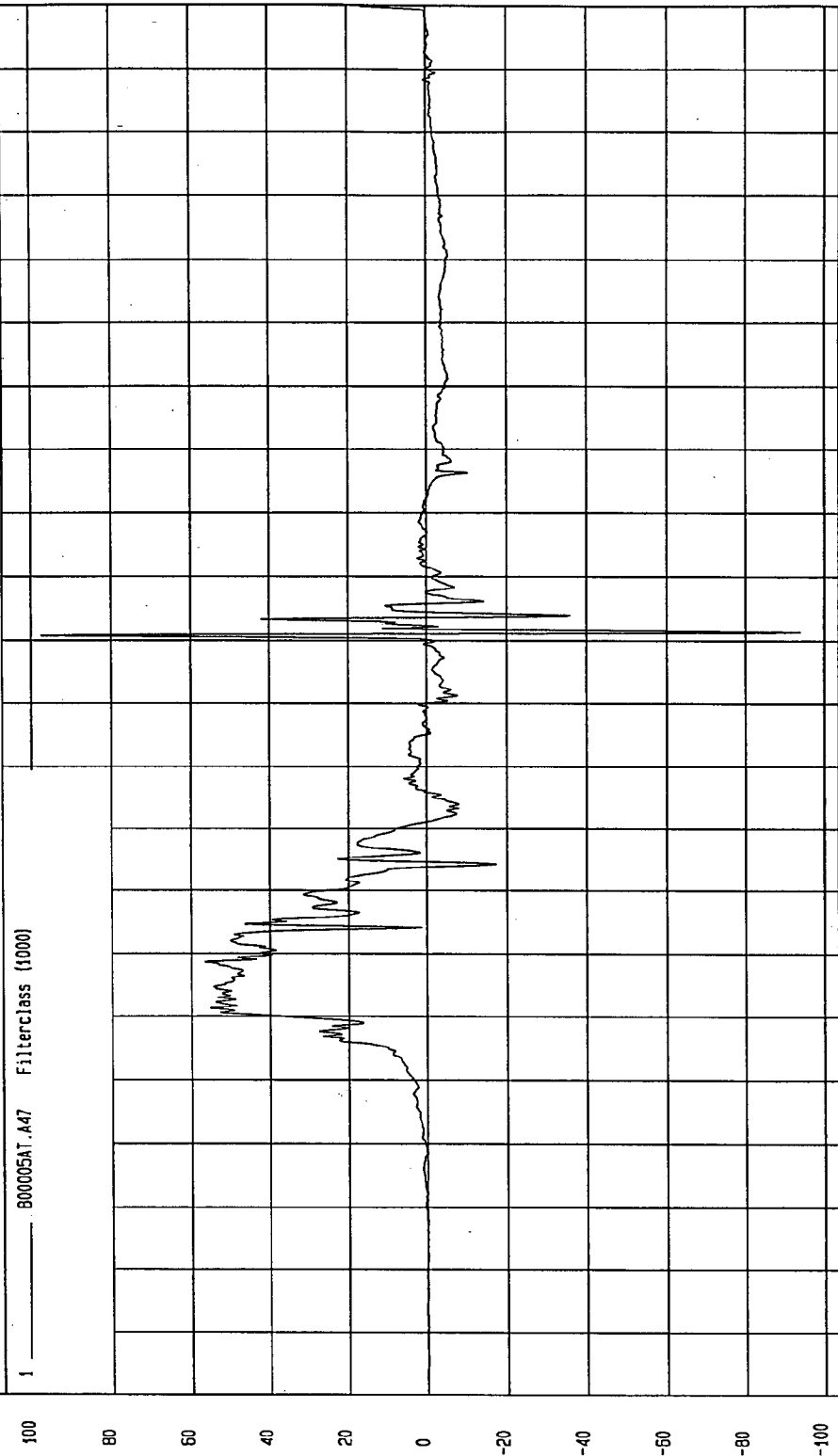
NGA Research
01-19-2000 14:52

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -94.06 G'S at 101 msec Maximum = 97.54 G'S at 101 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION



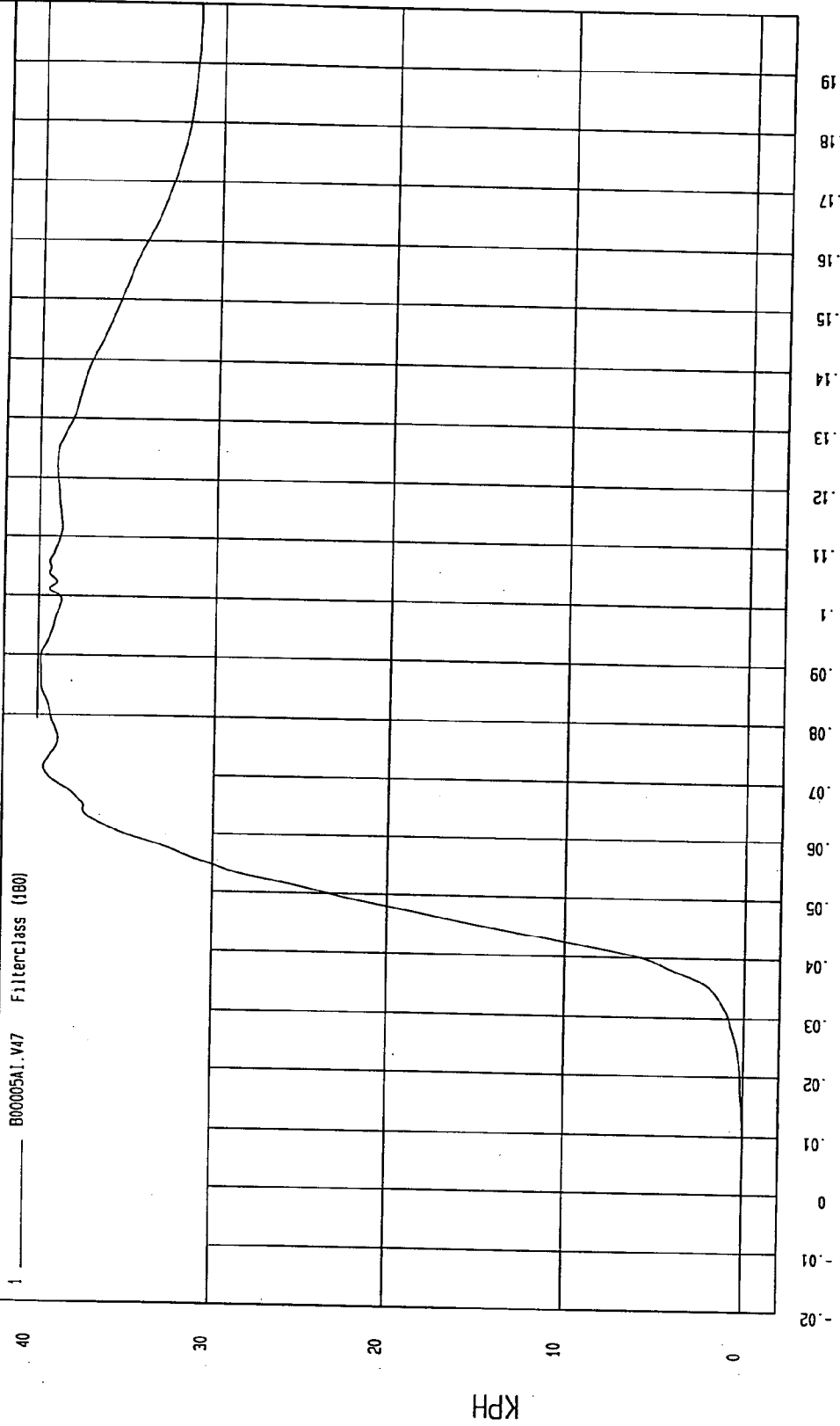
MEA Research
01-19-2000 14:52

TIME (SECONDS)

G.S

TEST: FMVSS 214 INDICANT
TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102)
Speed: 38.5 MPH 62 KPH
Minimum = -.01 KPH at -8 msec
Maximum = 39.84 KPH at 90 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY



NGA Research
01-19-2000 14:52

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

Minimum = -11.74 G'S at 69 msec

Maximum = 55.17 G'S at 44 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 ——— B00005AF.A48 Filterclass (100)



WGA Research
01-19-2000 14:52

TIME (SECONDS)

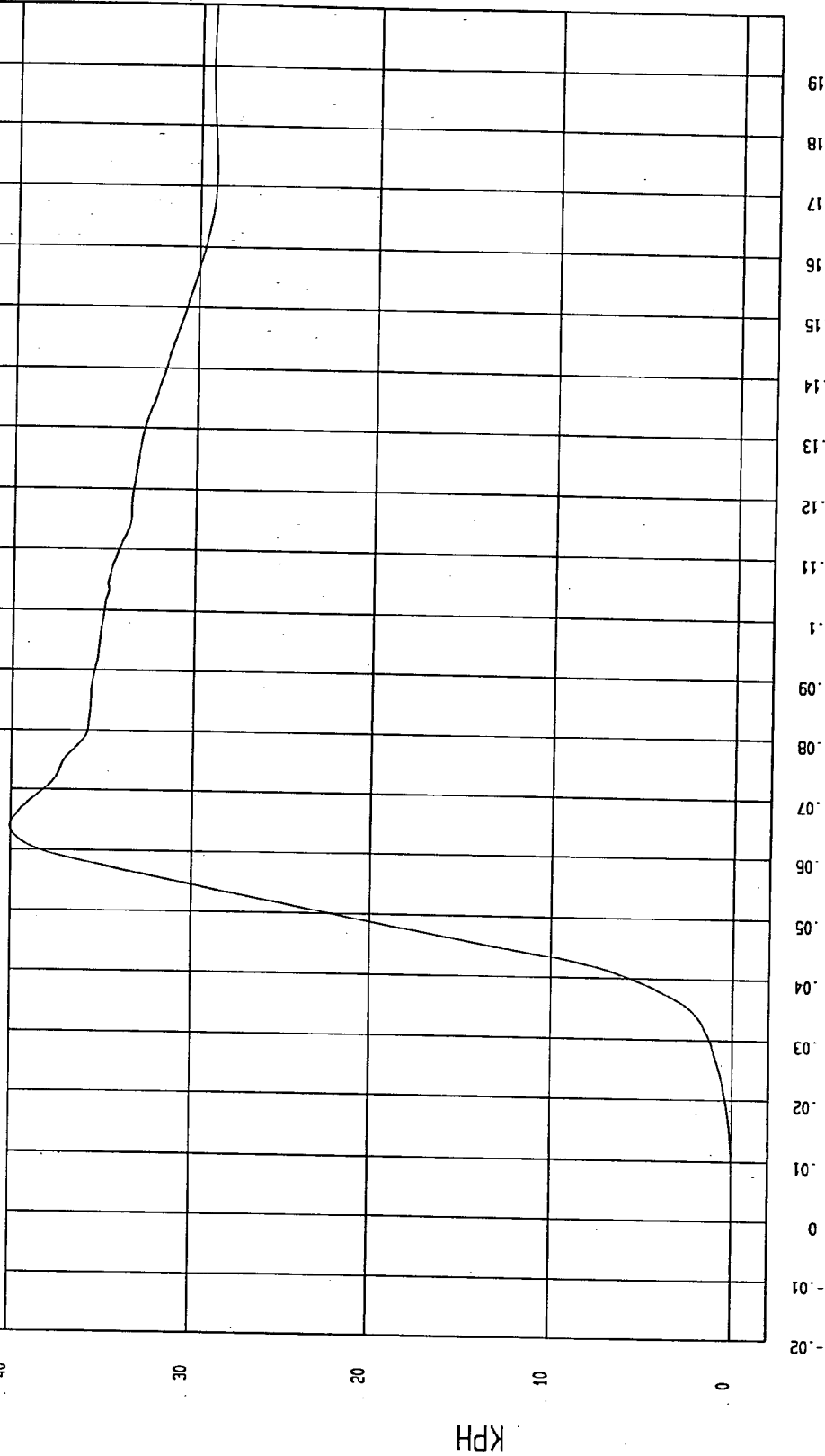
TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -6.95E-03 KPH at -16 msec Maximum = 40.05 KPH at 64 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— 800005A1.V4B Filterclass (180)



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

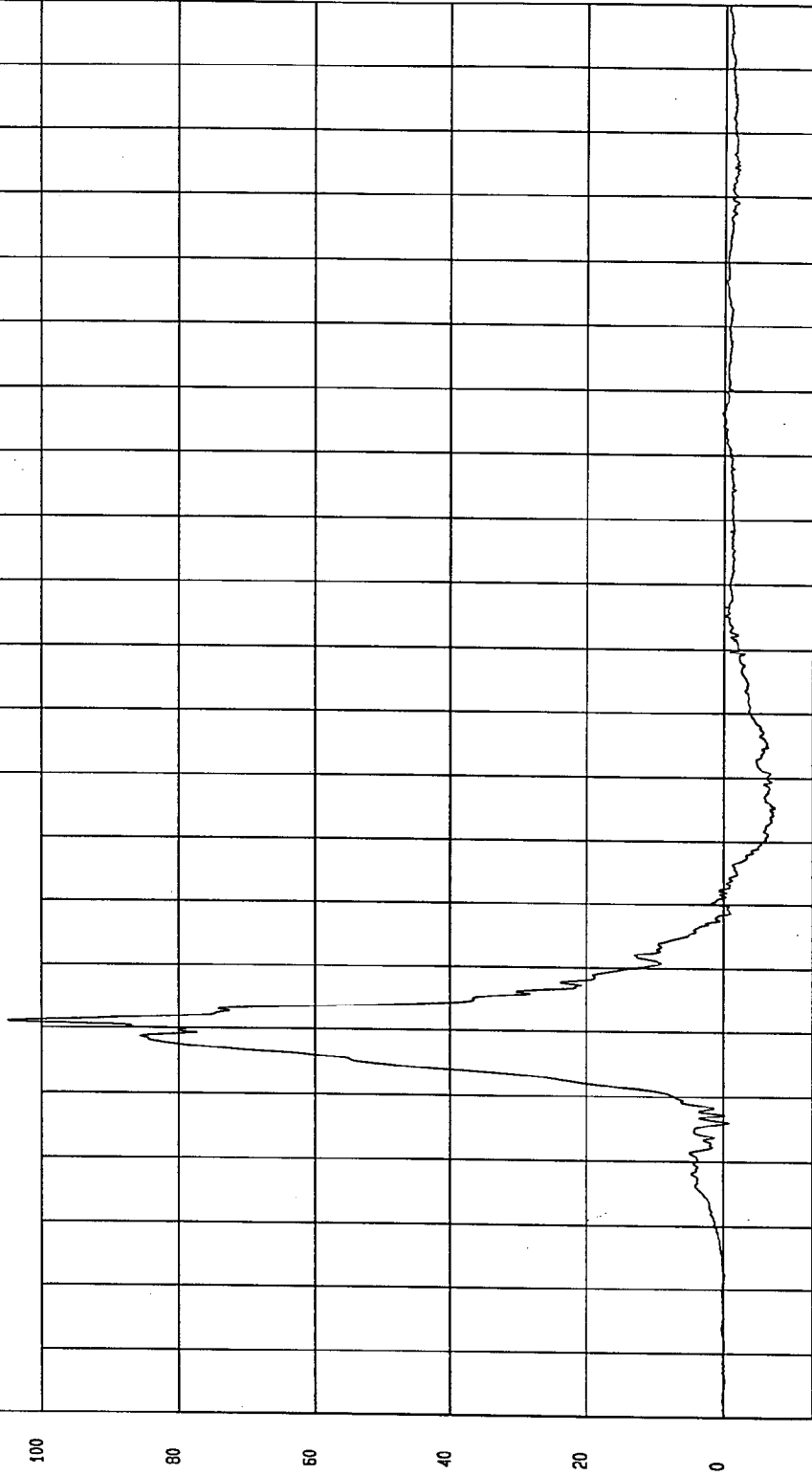
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 105.06 G'S at 41 msec

Minimum = -7.56 G'S at 75 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 800005AT.A49 Filterclass (1000)



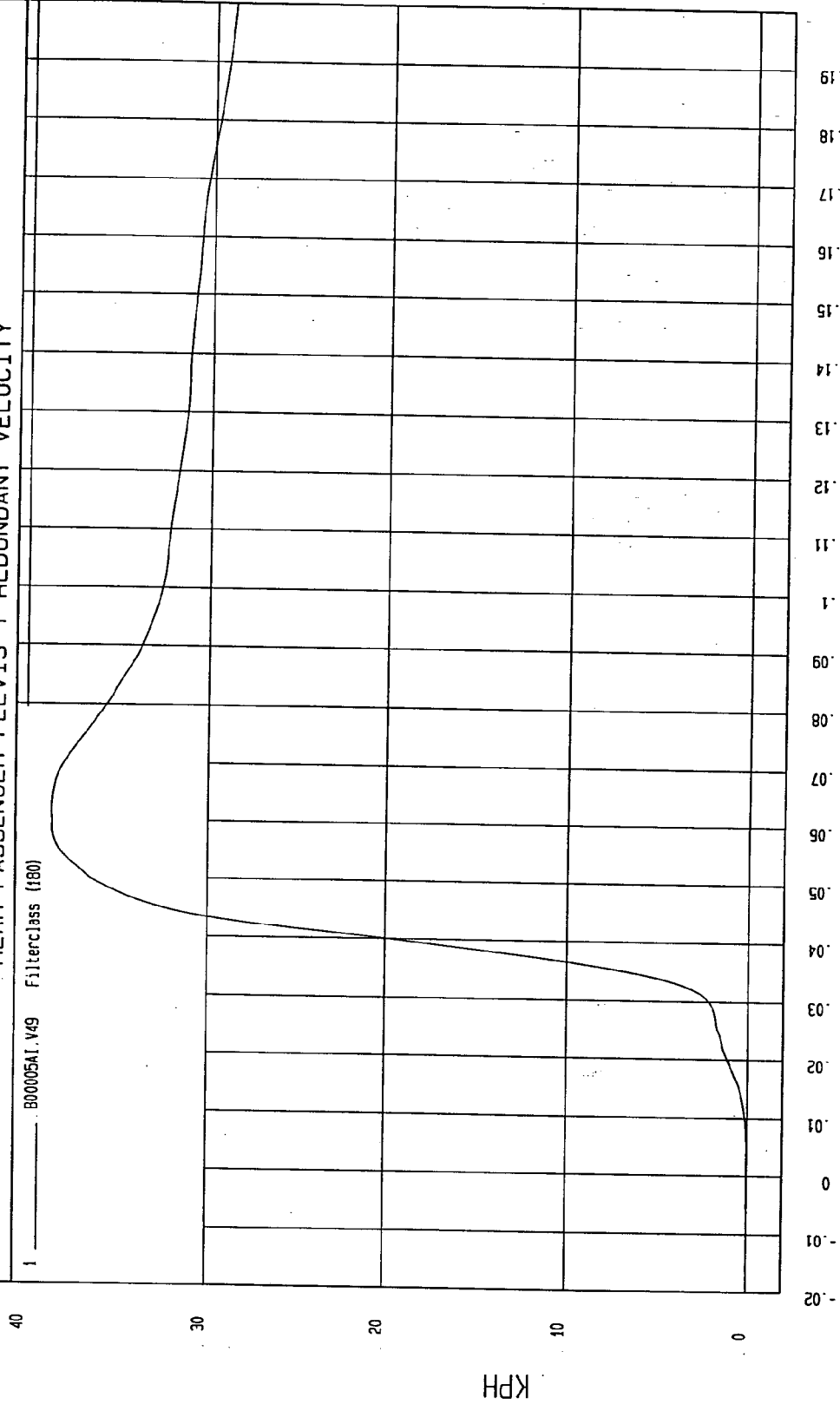
WCA Research
01-19-2000 14:52

TEST: FMVSS 214 INDICANT
TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102)
Speed: 38.5 MPH 62 KPH

Minimum = -3.36E-03 KPH at -8 msec
Maximum = 38.66 KPH at 62 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY

1 B00005A1.V49 FilterClass (180)



NCA Research
01-19-2000 14:52

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

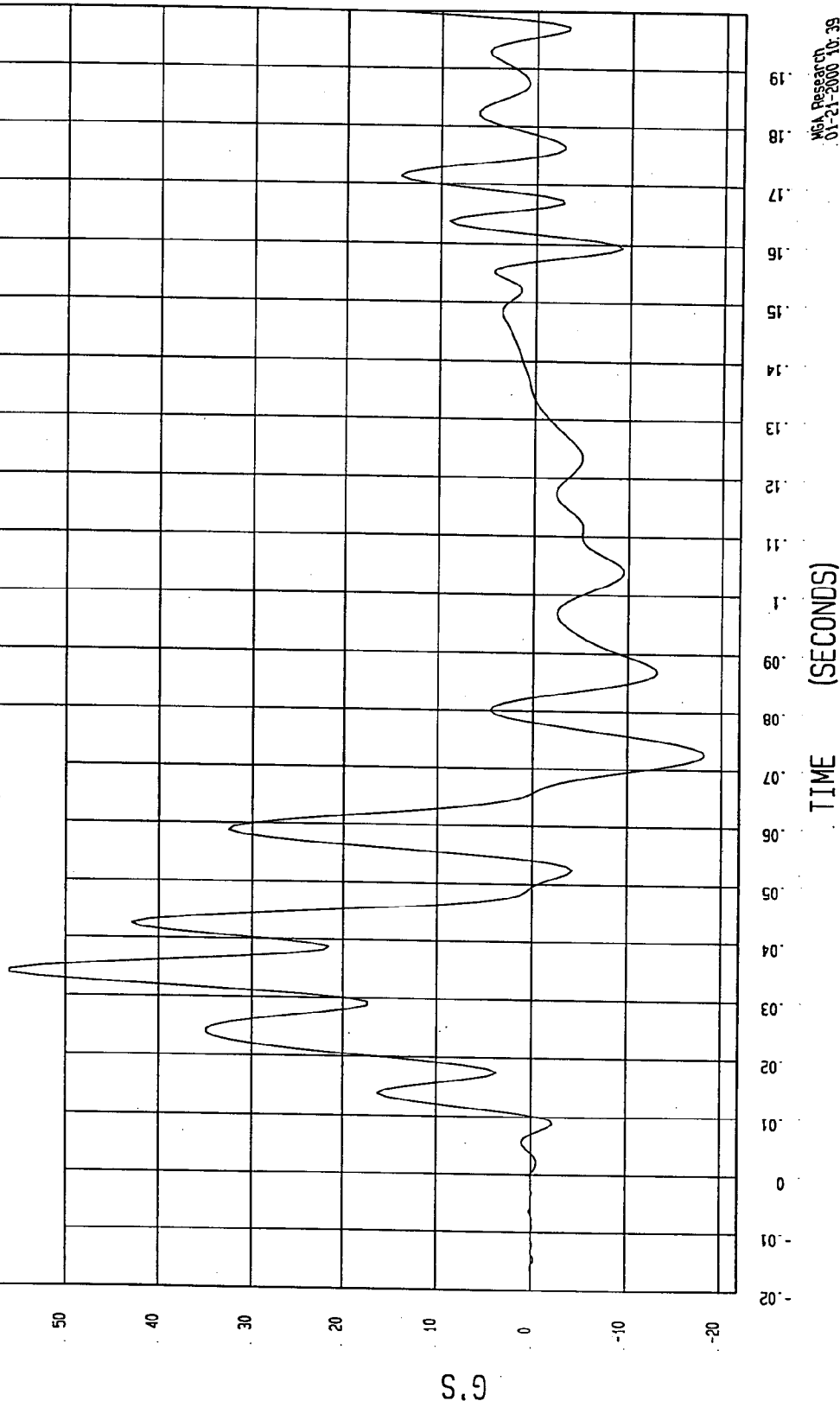
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 55.99 G'S at 34 msec

Minimum = -18.2 G'S at 72 msec

DRIVER UPPER RIB Y ACCELERATION

1 800005F1.R15 FilterClass (FIR Filtered)

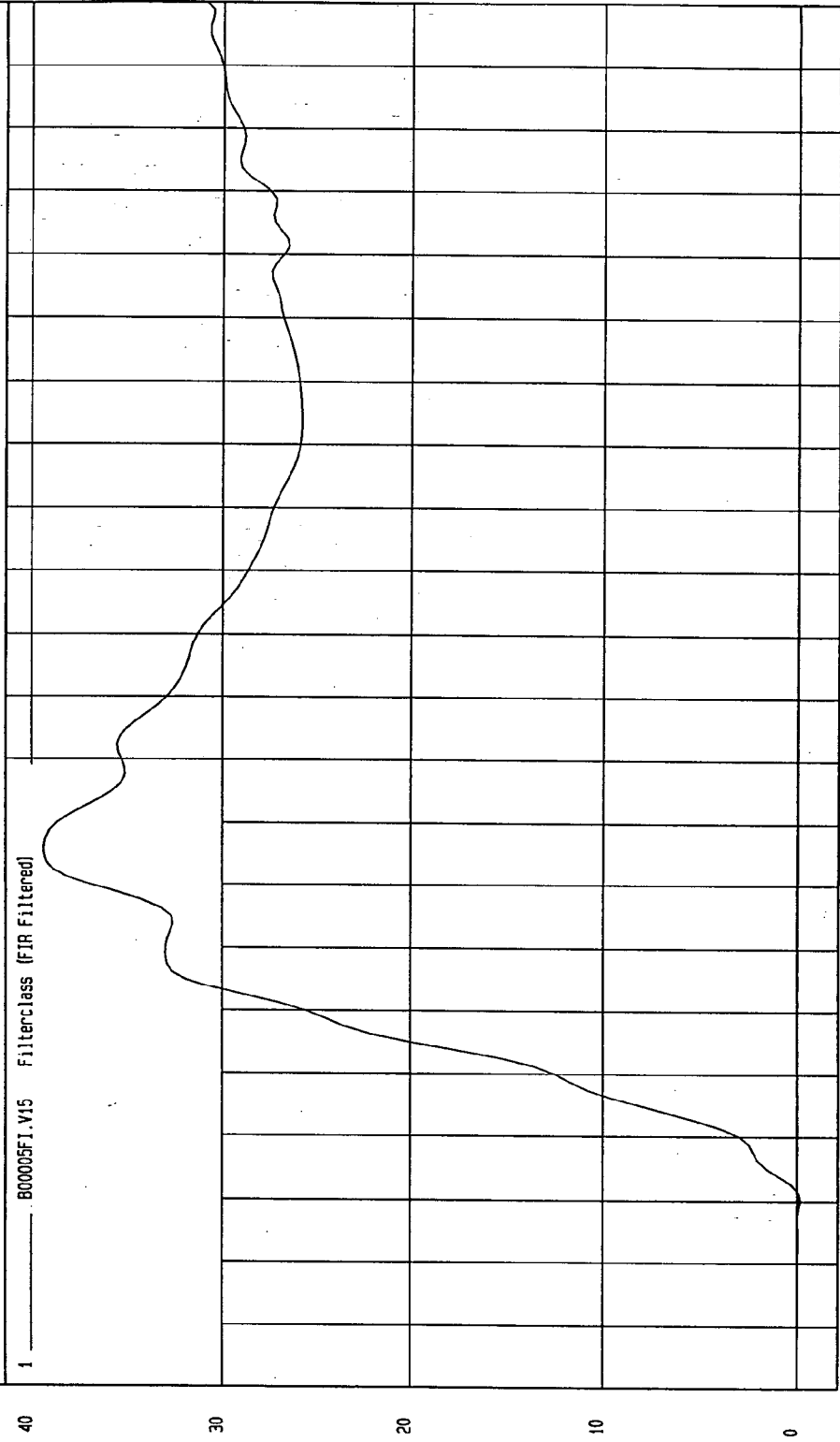
MGA Research
01-21-2000 10:39

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -.15 KPH at 10 msec Maximum = 39.35 KPH at 66 msec

DRIVER UPPER RIB Y VELOCITY

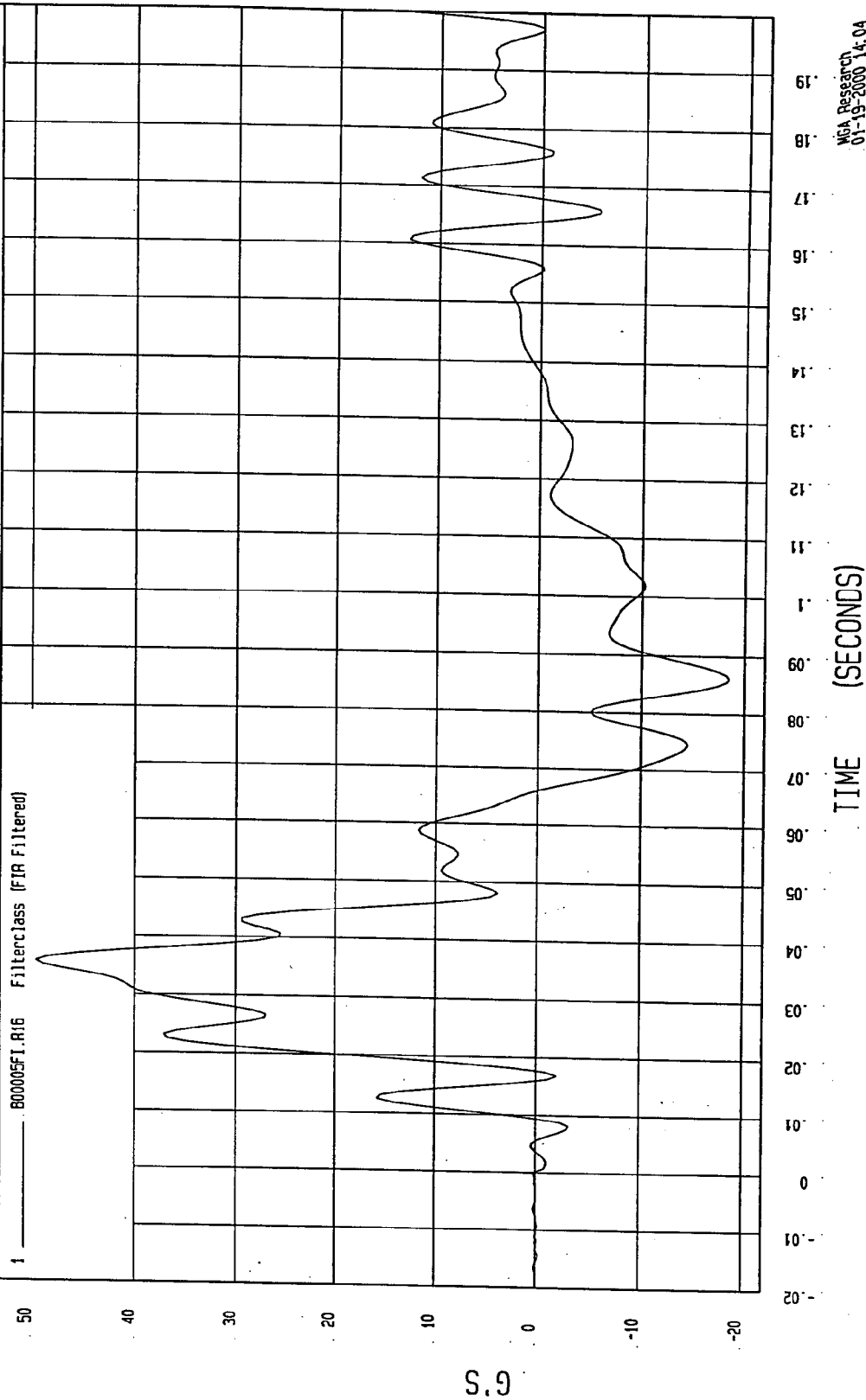


TIME Seconds

NBA Research
01-19-2000 15:04

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH
Minimum = -18.51 G'S at 86 msec Maximum = 49.57 G'S at 36 msec

DRIVER LOWER RIB Y ACCELERATION



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

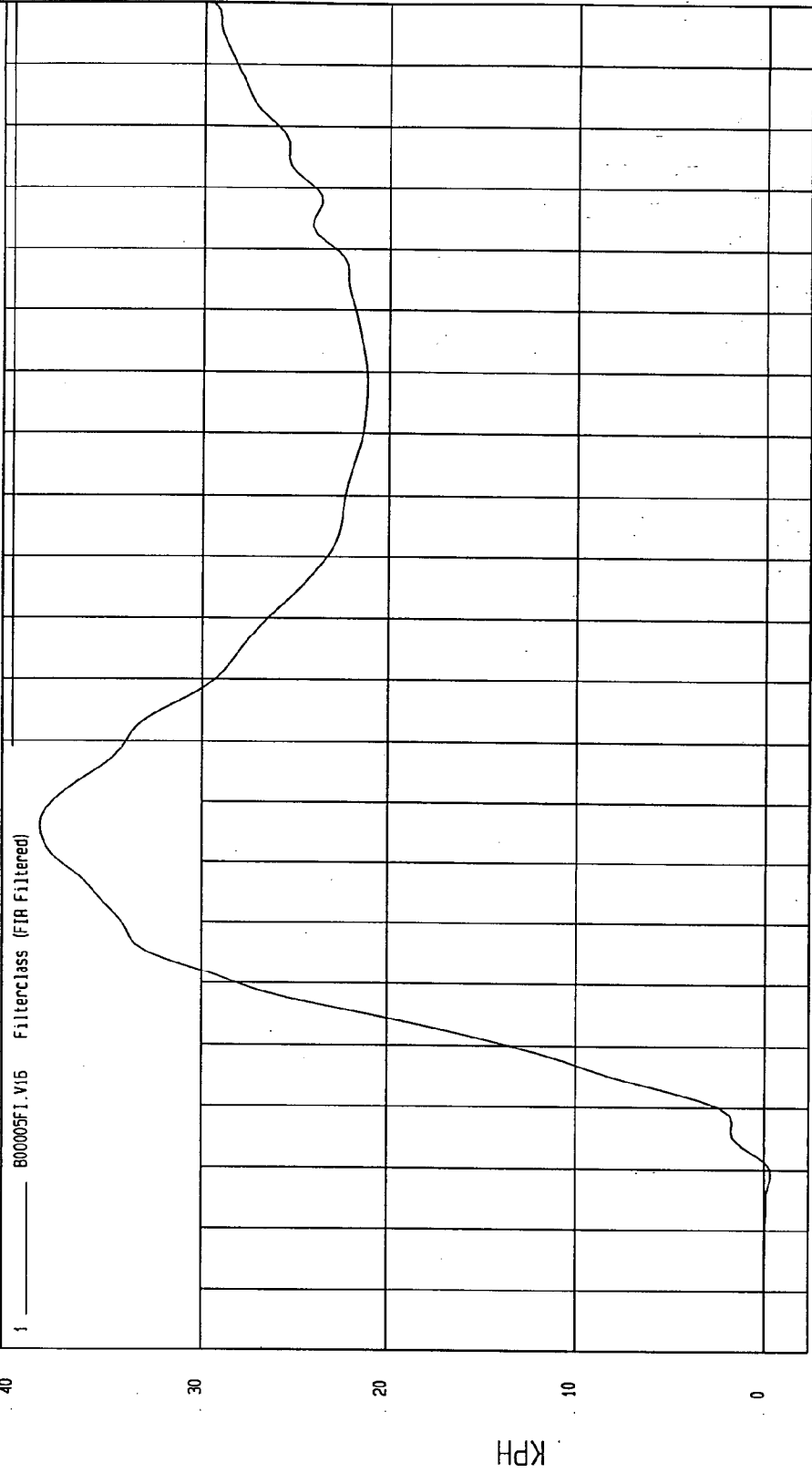
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

Minimum = -35 KPH at 9 msec

Maximum = 38.59 KPH at 66 msec

DRIVER LOWER RIB Y VELOCITY

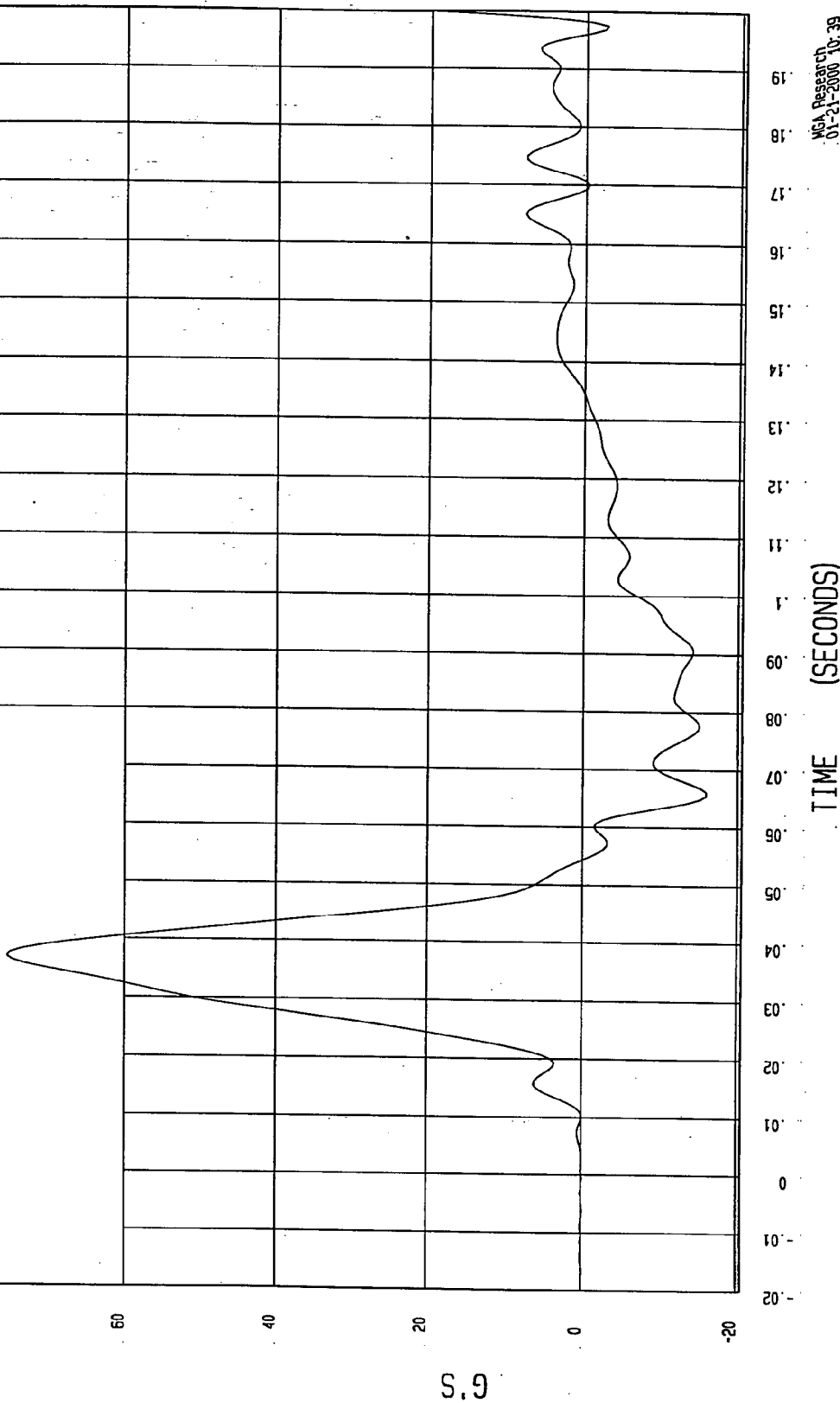


WCA Research
01-19-2000 15:04

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000
COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH
Minimum = -16 G'S at 66 msec Maximum = 75.42 G'S at 37 msec

DRIVER LOWER SPINE Y ACCELERATION

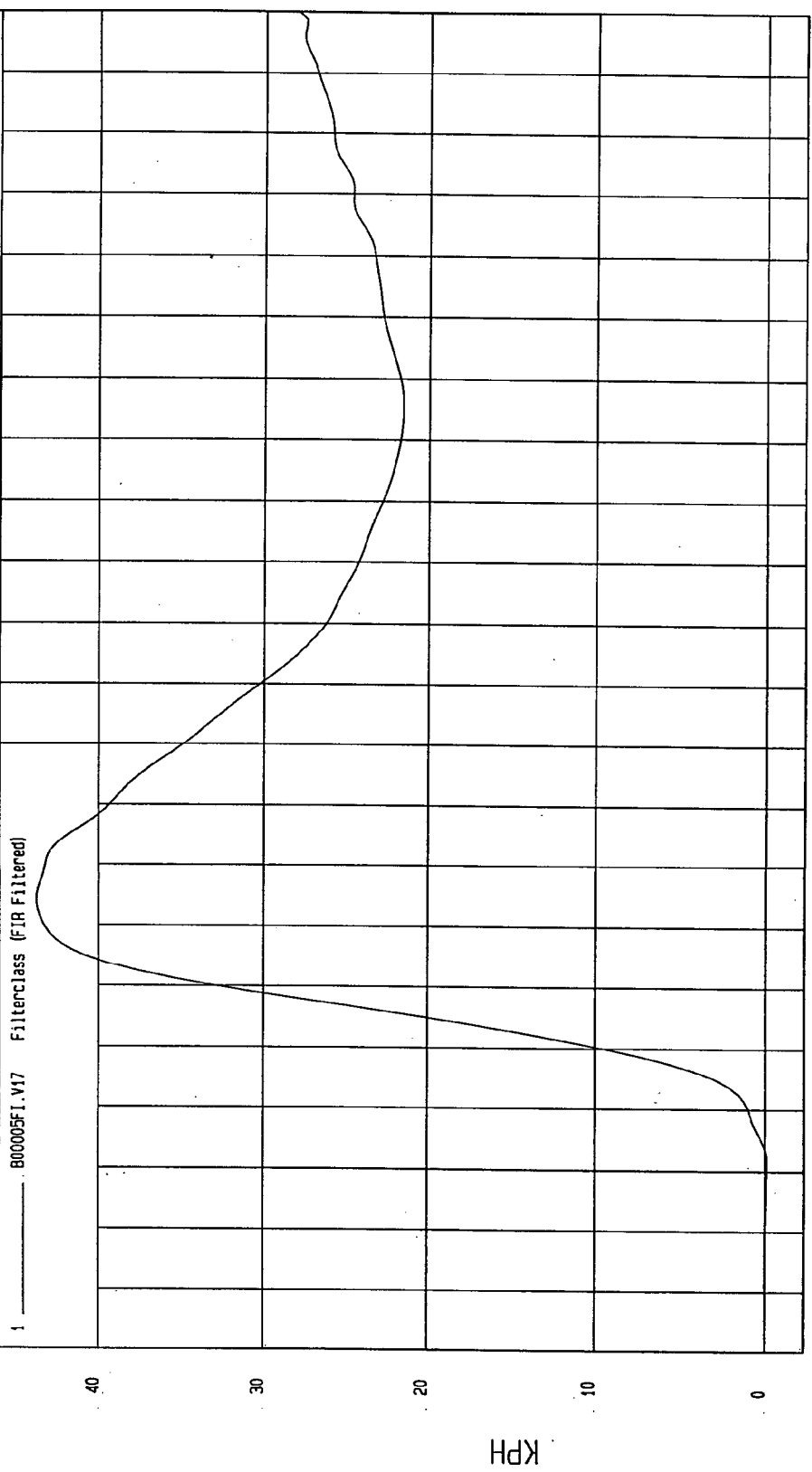
1 80005FI.RH7 FilterClass (FIR Filtered)

MCA Research
01-21-2000 10:39

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000
 COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -1.1 KPH at 11 msec Maximum = 43.68 KPH at 54 msec

DRIVER LOWER SPINE Y VELOCITY



VSA Research
 01-19-2000 15:04

TIME Seconds

KPH

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

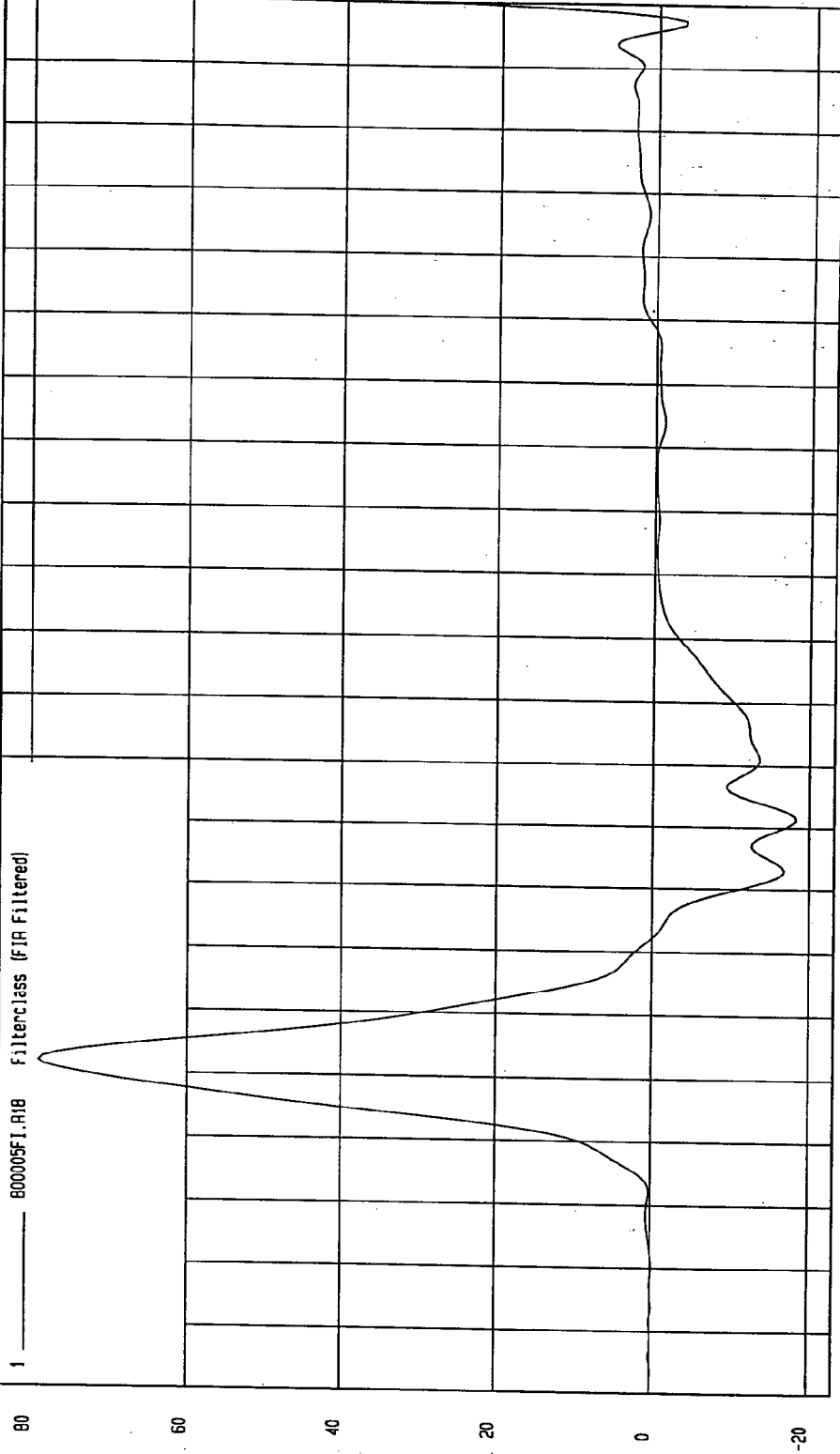
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Minimum = -18.28 G'S at 71 msec

Maximum = 79.02 G'S at 32 msec

DRIVER PELVIS Y ACCELERATION



VSA Research
01-21-2000 10:39

TIME (SECONDS)

G.S

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

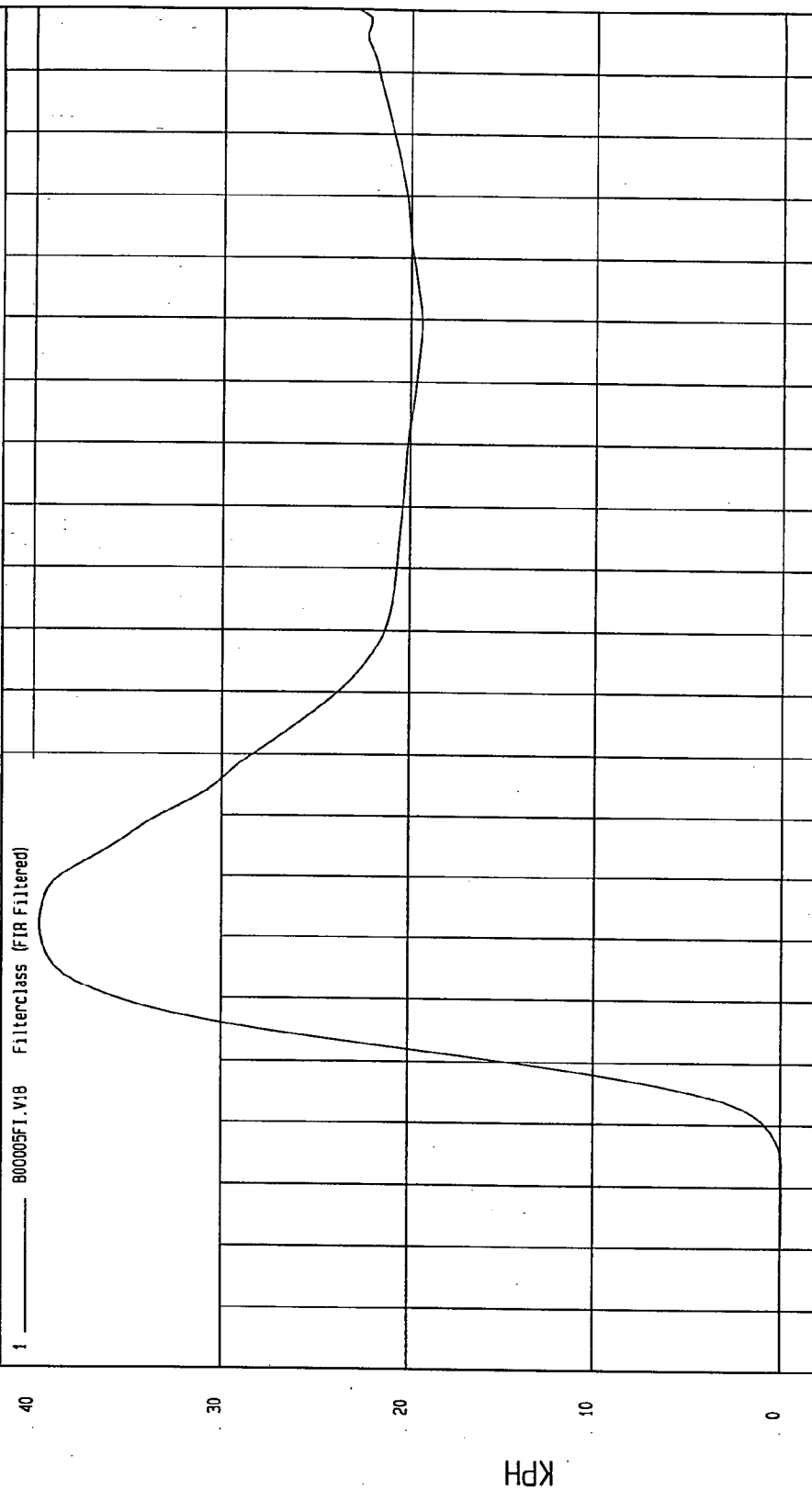
Speed: 38.5 MPH 62 KPH

Minimum = -.06 KPH at 6 msec

Maximum = 39.69 KPH at 52 msec

DRIVER PELVIS Y VELOCITY

1 — 800005F1.V18 Filterclass (FIR Filtered)



WCA Research
01-19-2000 15:04

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

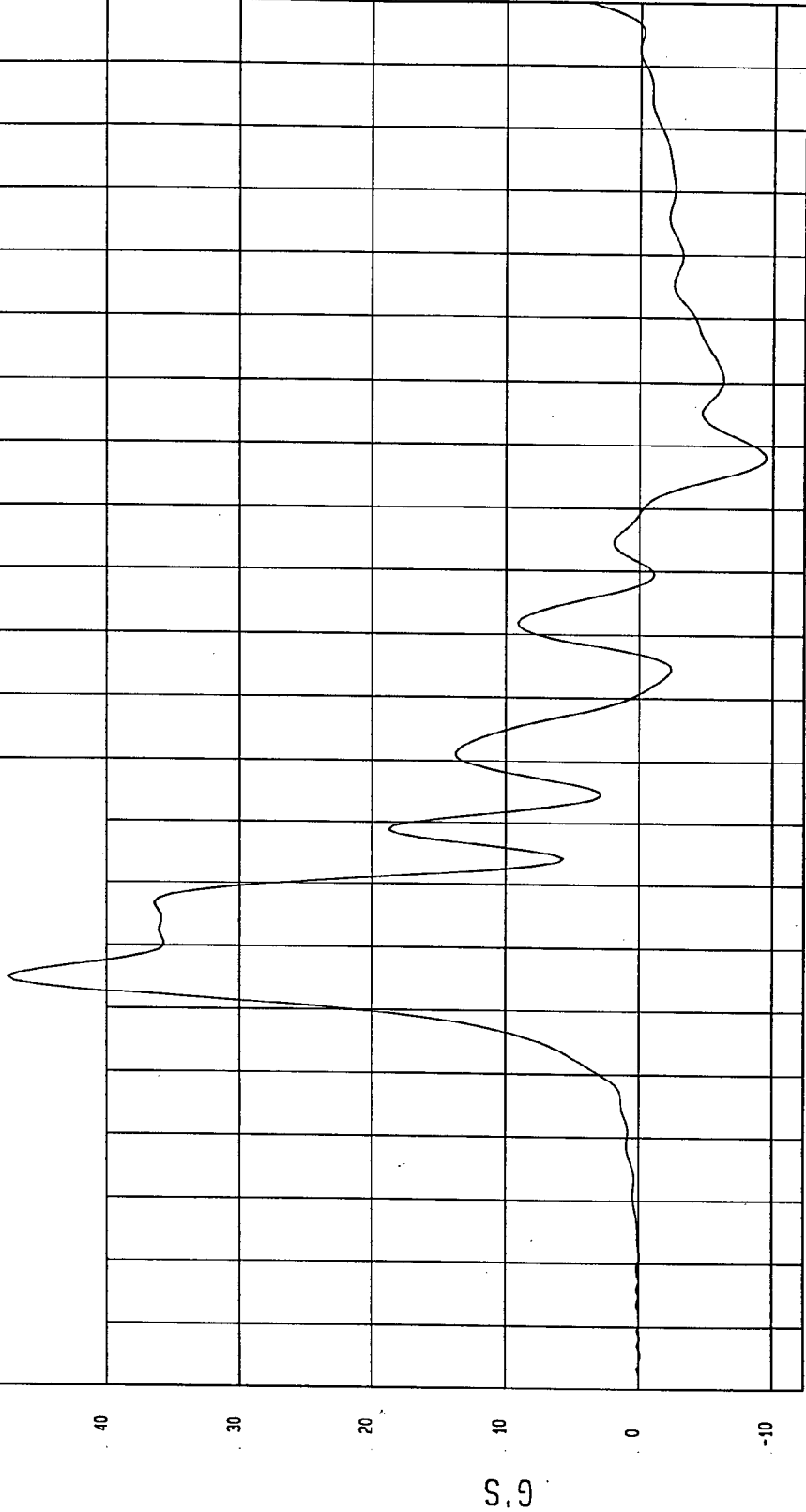
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 47.43 G'S at 45 msec

Minimum = -9.5 G'S at 128 msec

REAR PASSENGER UPPER RIB Y ACCELERATION

1 800005F1.R25 FilterClass (FIR Filtered)



NCA Research
01-19-2000 15:16

TIME (SECONDS)

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

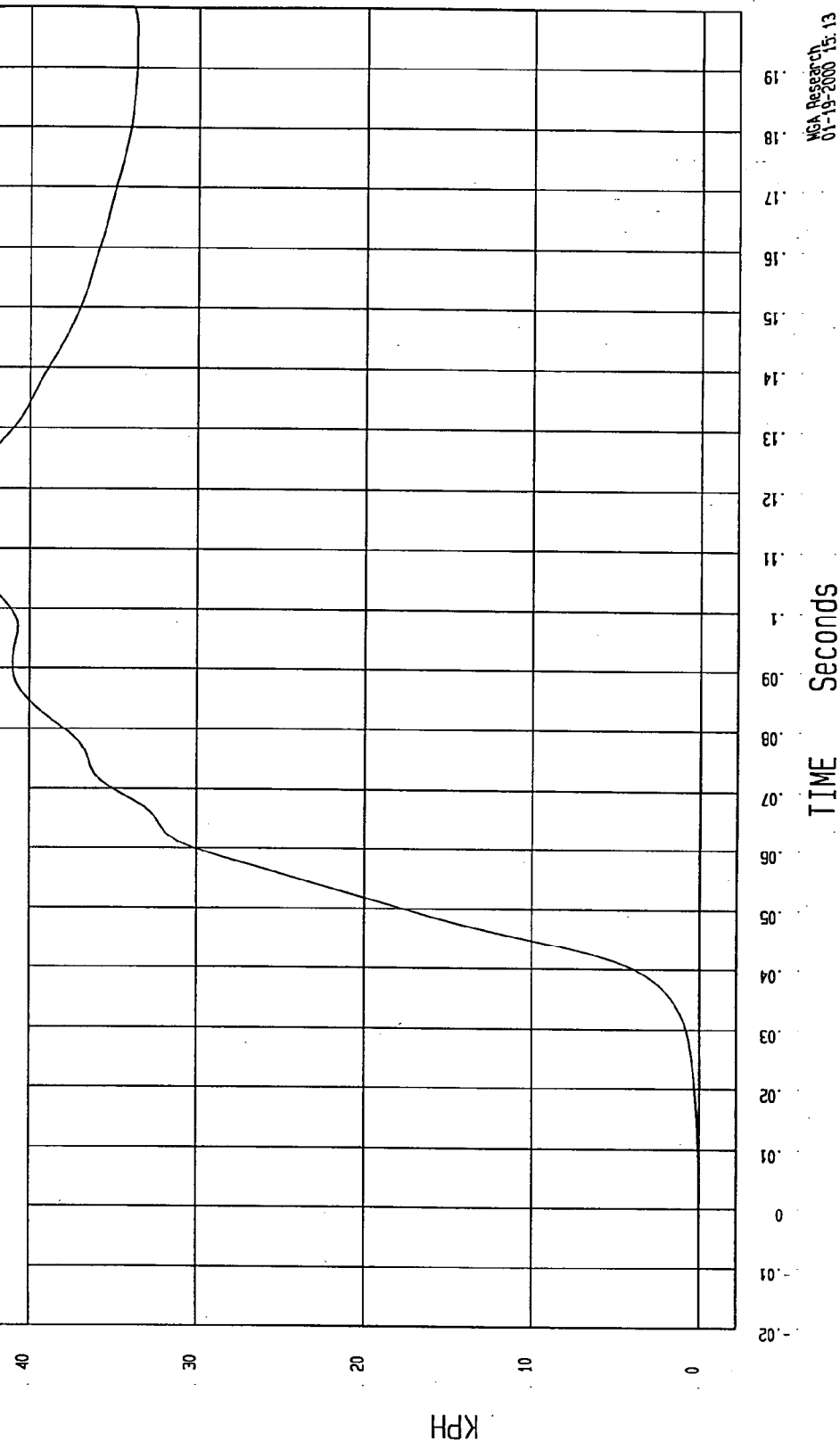
Speed: 38.5 MPH 62 KPH

Minimum = -2.33E-03 KPH at -14 msec

Maximum = 42.96 KPH at 119 msec

REAR PASSENGER UPPER RIB Y VELOCITY

1 800005F1.V25 Filterclass (FIR Filtered)

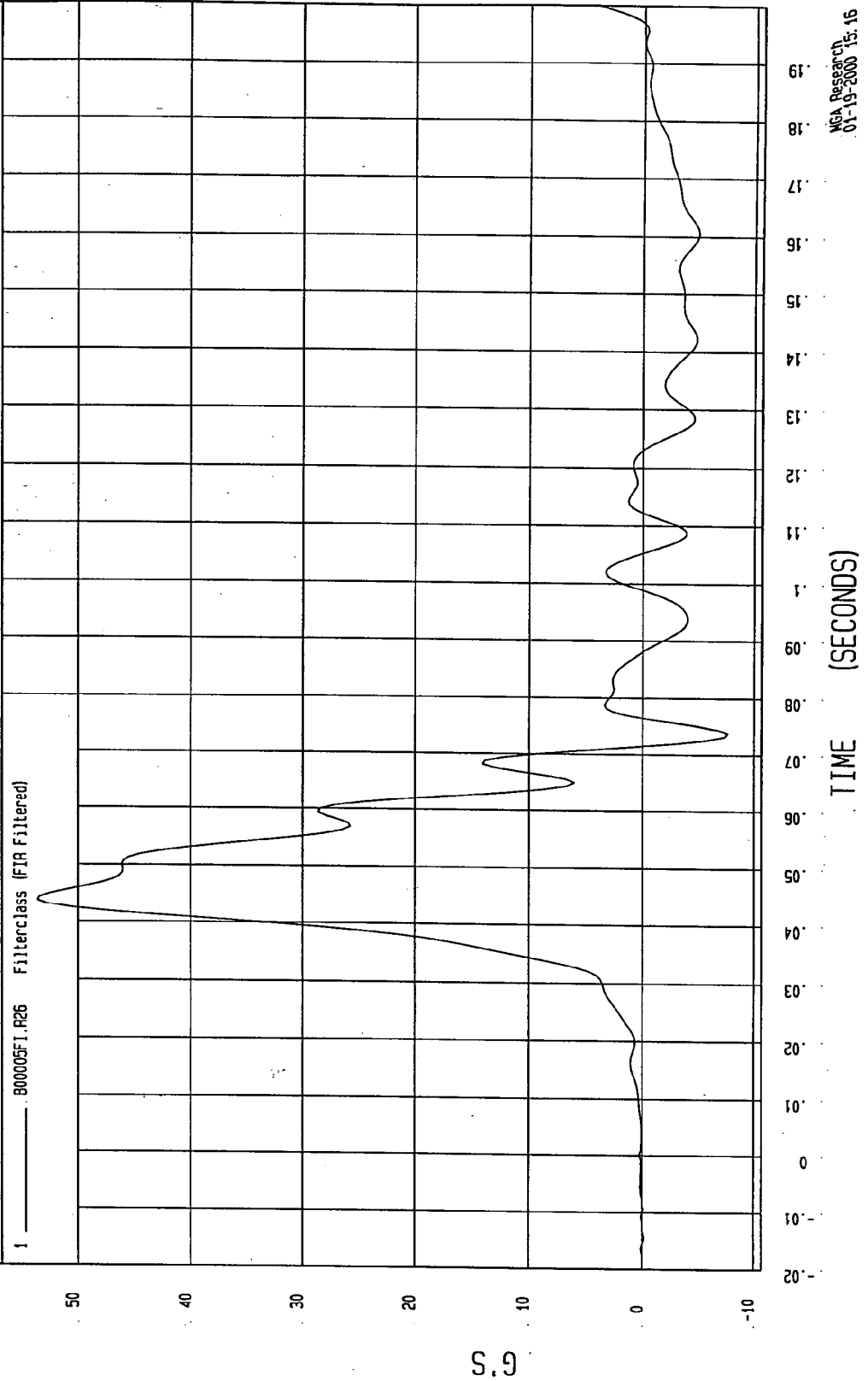
NCA Research
01-19-2000 15.13

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

Maximum = 53.53 G'S at 44 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

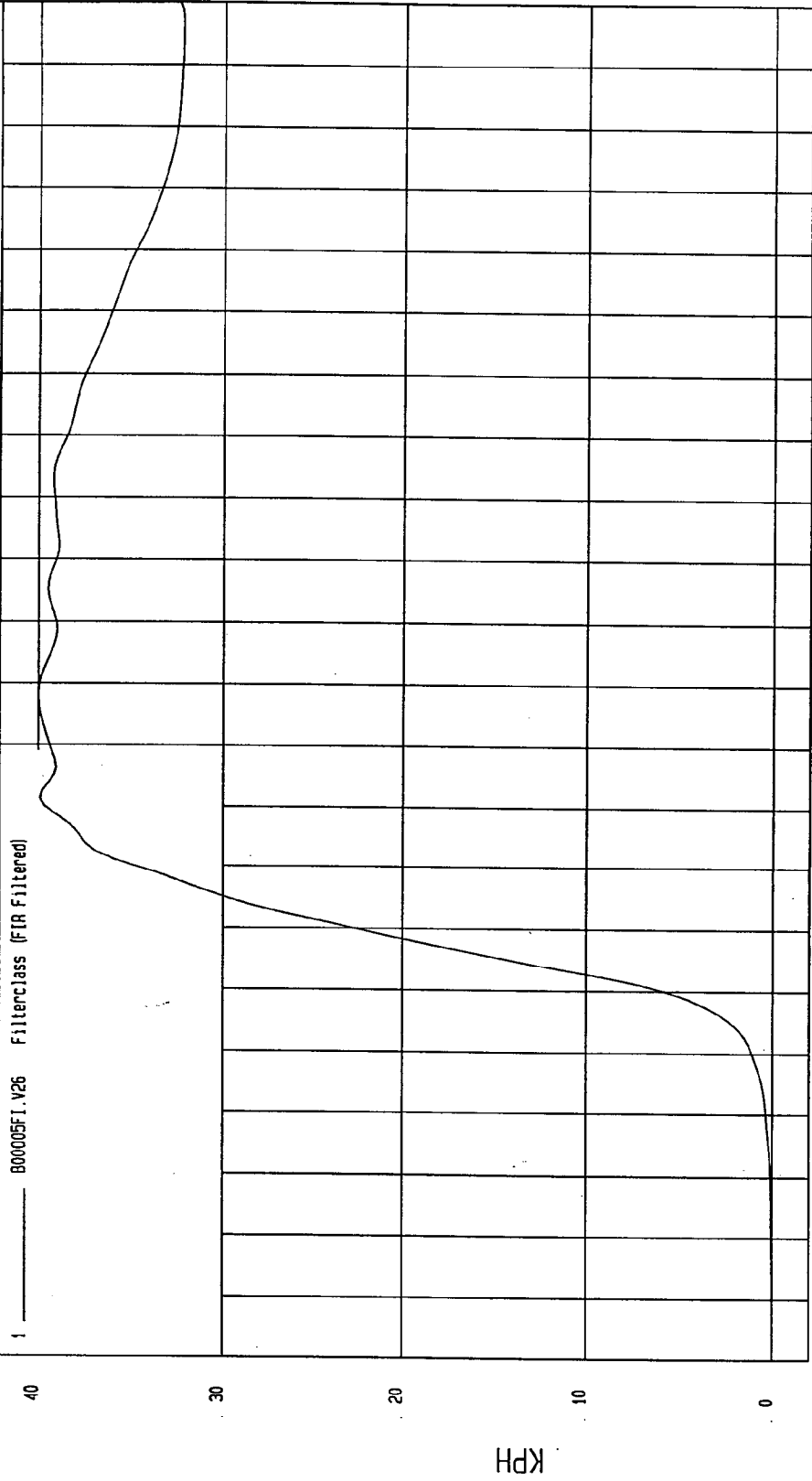
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 40.01 KPH at 88 msec

Minimum = -2.95E-04 KPH at -13 msec

REAR PASSENGER LOWER RIB Y VELOCITY



NGA Research
01-19-2000 15:13

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

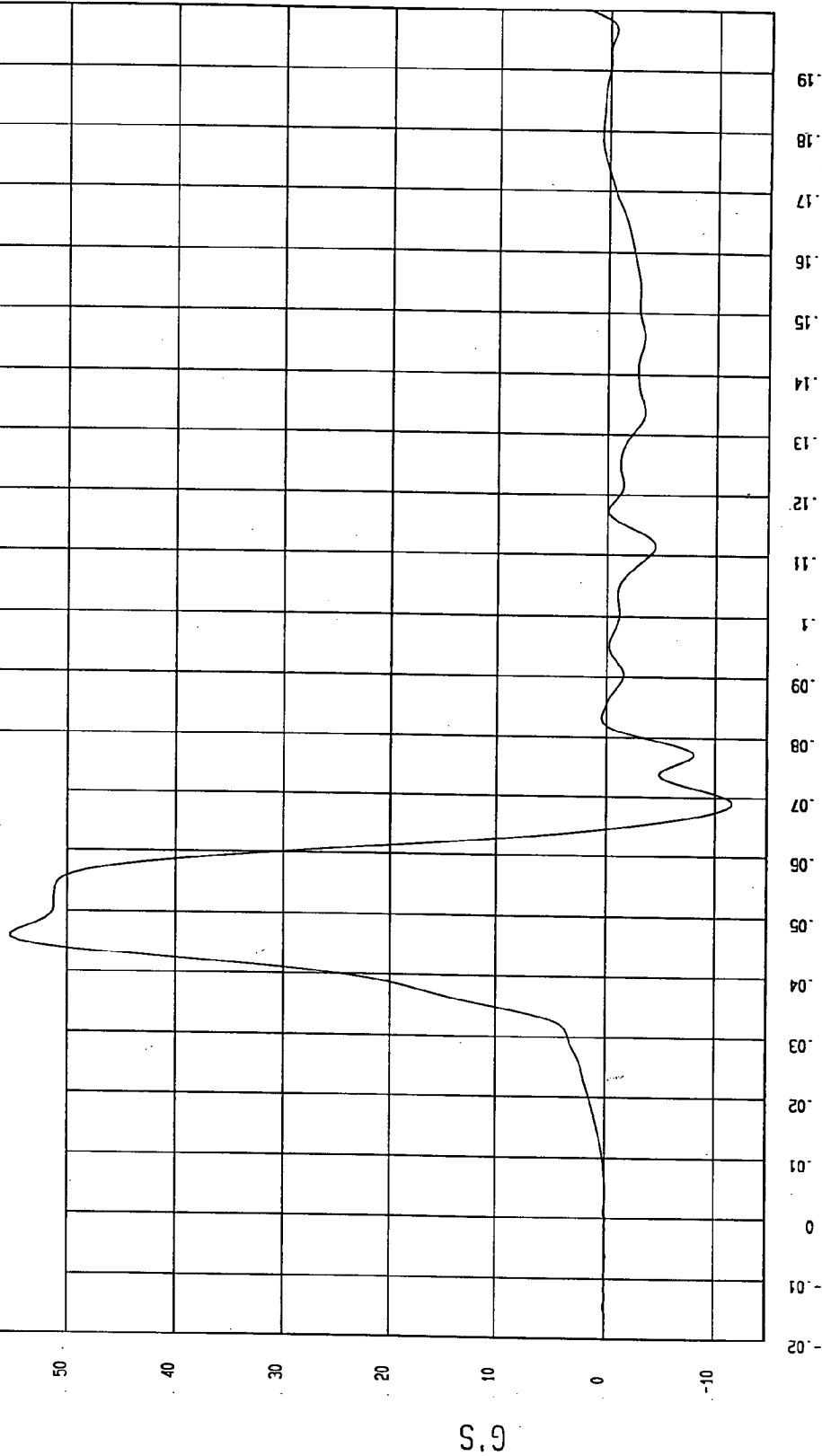
Speed: 38.5 MPH 62 KPH

Minimum = -11.57 G'S at 69 msec

Maximum = 55.33 G'S at 46 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 B00005F1 R27 FilterClass (FIR Filtered)



WCA Research
01-19-2000 15:16

TIME (SECONDS)

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

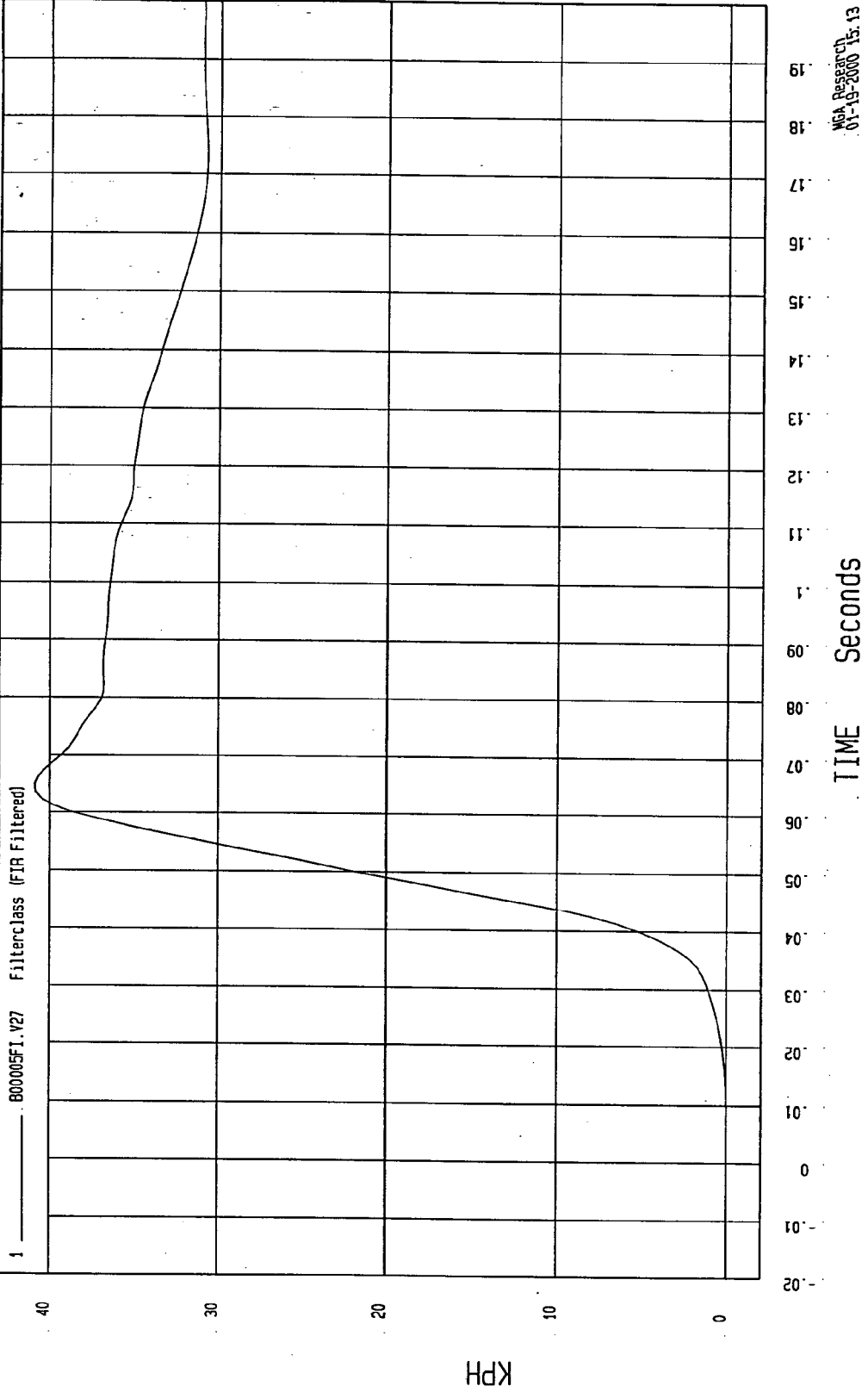
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

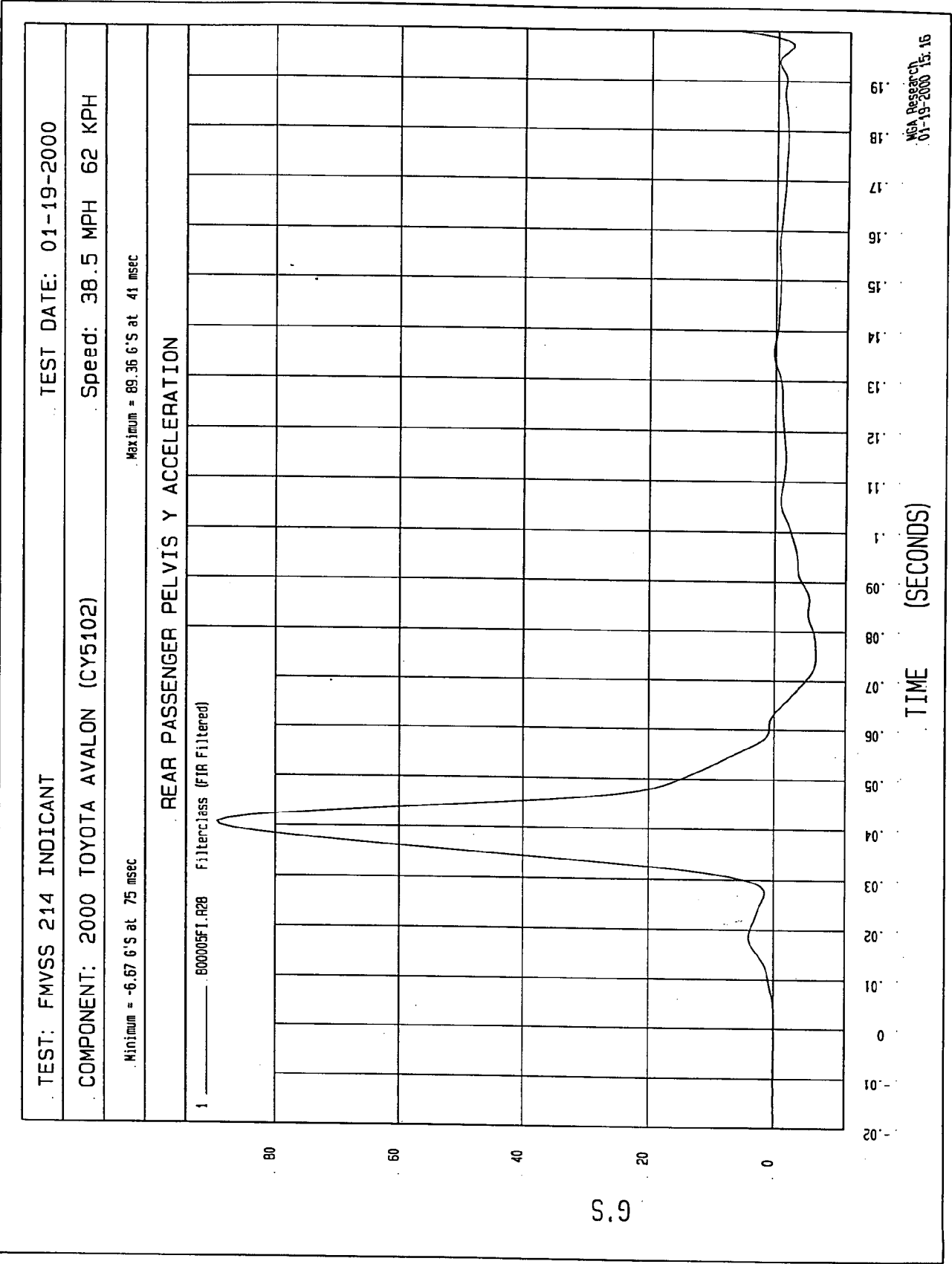
Minimum = -2.23E-02 KPH at 6 msec

Maximum = 40.87 KPH at 64 msec

REAR PASSENGER LOWER SPINE Y VELOCITY



NGA Research
01-19-2000 15:13

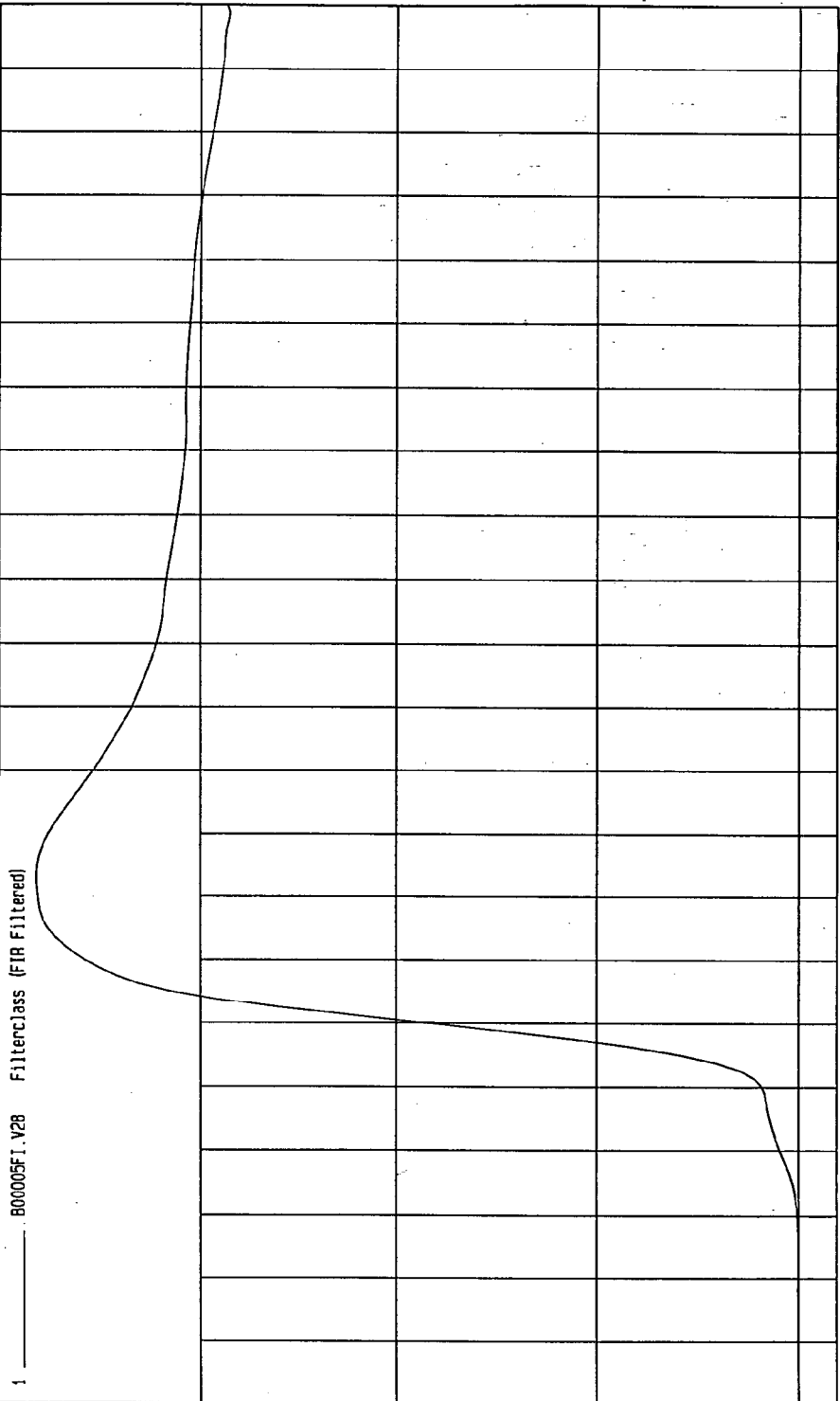


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -0.14E-03 KPH at 4 msec Maximum = 38.19 KPH at 63 msec

REAR PASSENGER PELVIS Y VELOCITY



TIME Seconds

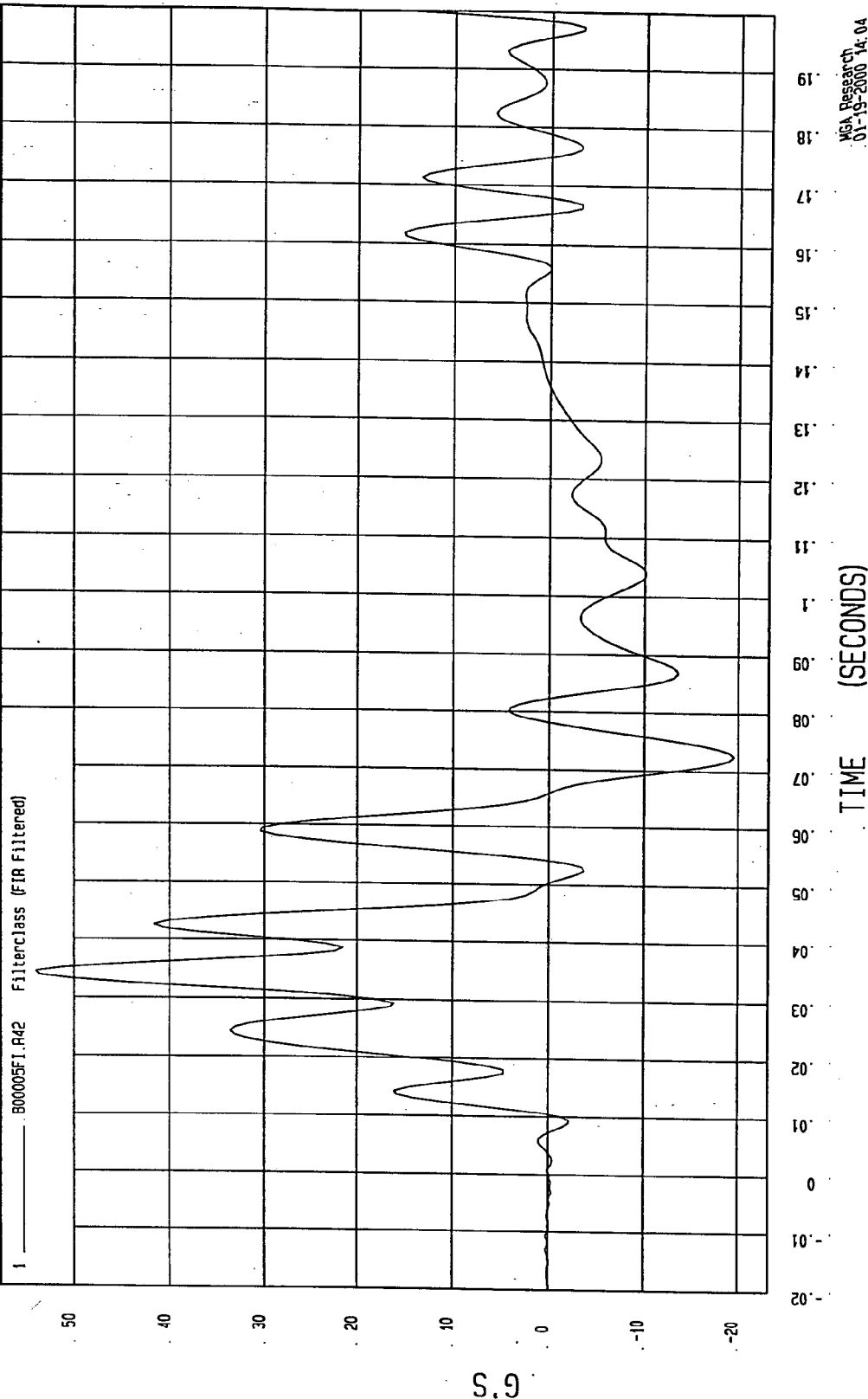
MOA Research
01-19-2000 15.13

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

Maximum = 53.97 G's at 34 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 38.13 KPH at 66 msec

Minimum = -0.95E-02 KPH at 11 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY

1 _____ BC0005F1.V42 Filterclass (FIR Filtered)

40

30

20

10

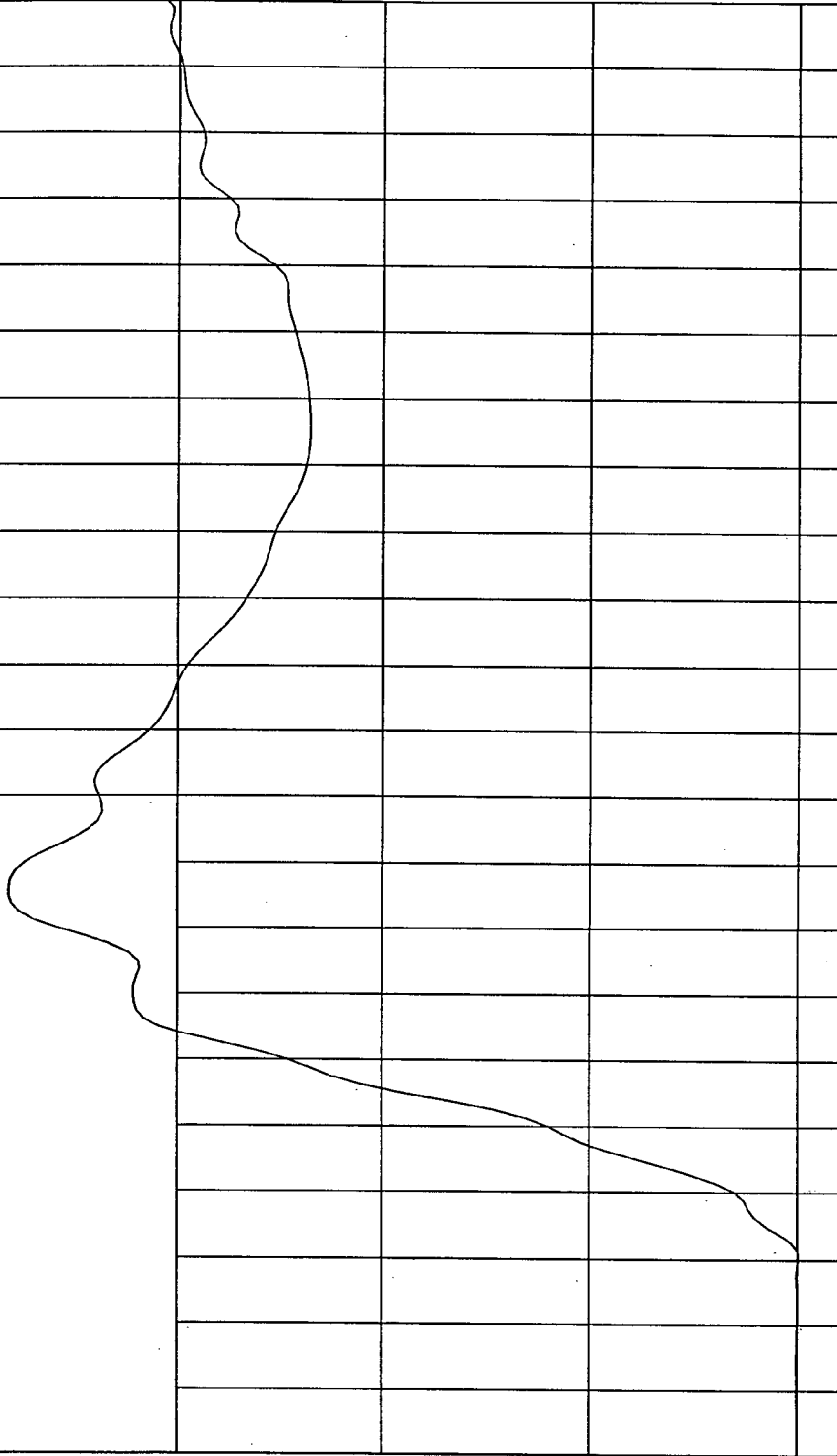
0

KPH

NGA Research
01-19-2000 15:04

TIME Seconds

-0.02 -0.01 0 .01 .02 .03 .04 .05 .06 .07 .08 .09 .1 .11 .12 .13 .14 .15 .16 .17 .18 .19

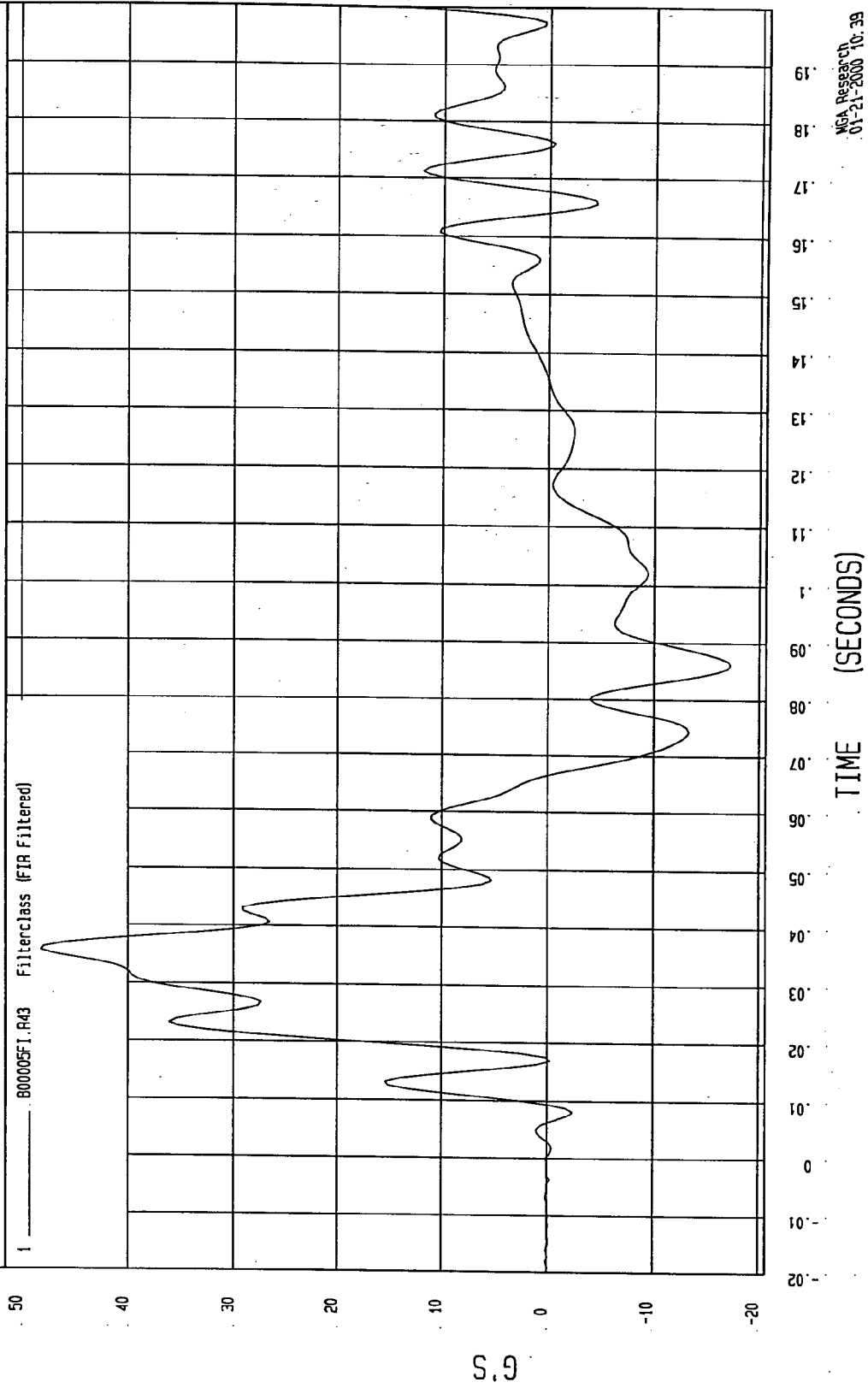


TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -17.31 G's at 86 msec Maximum = 48.17 G's at 36 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION

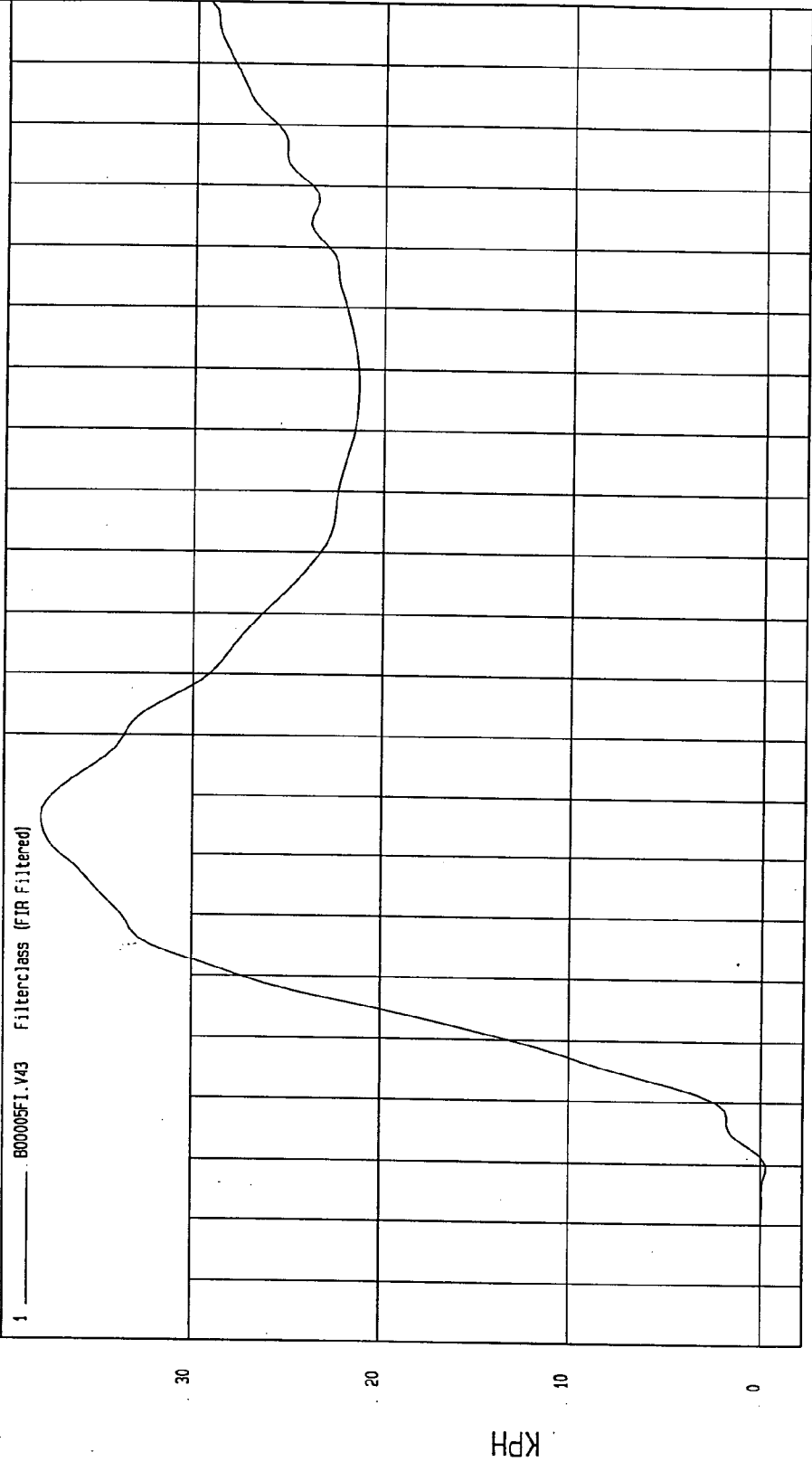


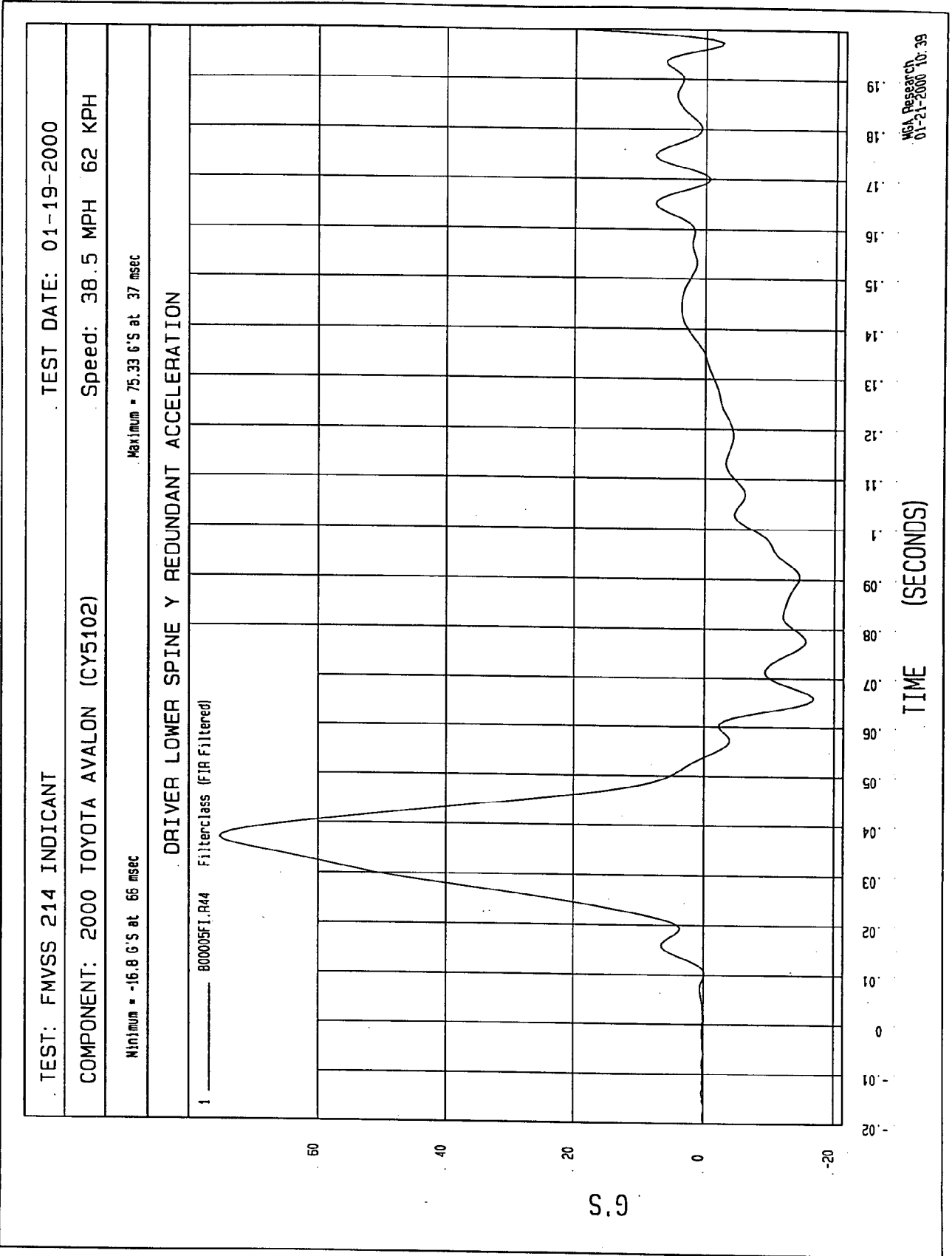
TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -.27 KPH at 9 msec Maximum = 37.92 KPH at 66 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY





TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

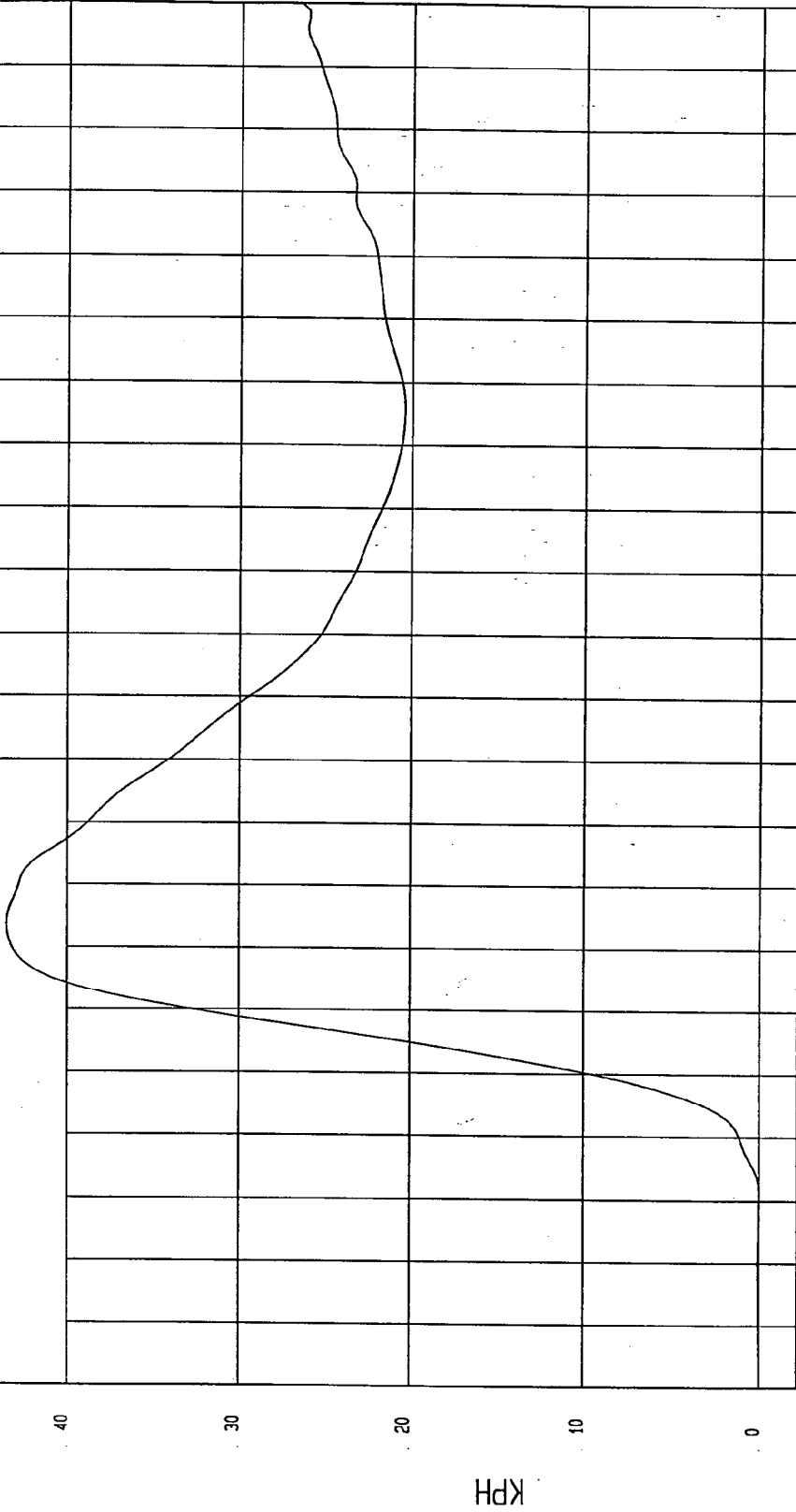
Speed: 38.5 MPH 62 KPH

Minimum = 0 KPH at -20 msec

Maximum = 43.51 KPH at 54 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

1 B00005F1.V44 Filterclass (FIR Filtered)



NGA Research
01-19-2000 15:05

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

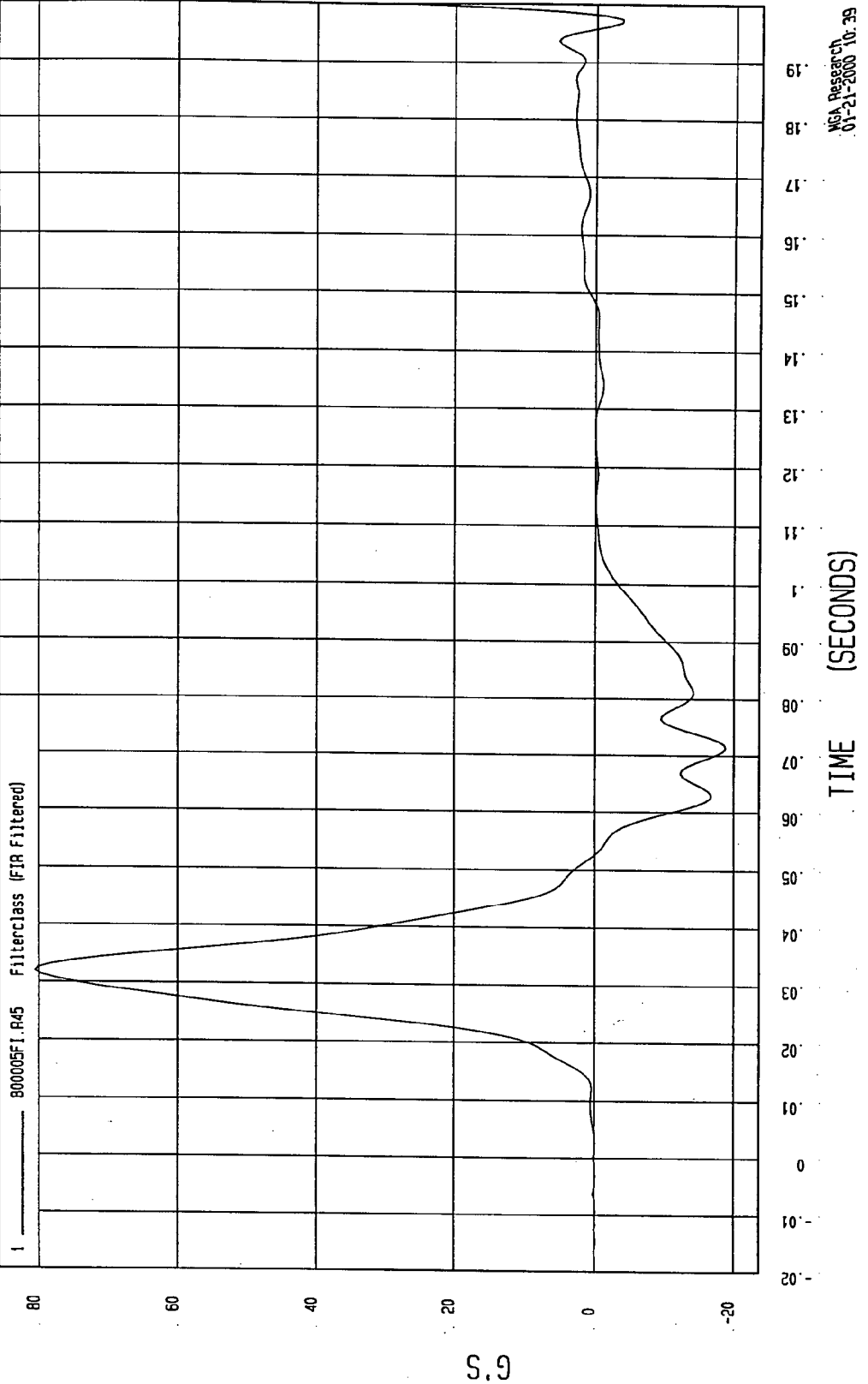
Speed: 38.5 MPH 62 KPH

COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 80.59 G'S at 32 msec

Minimum = -18.76 G'S at 71 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



G.S

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

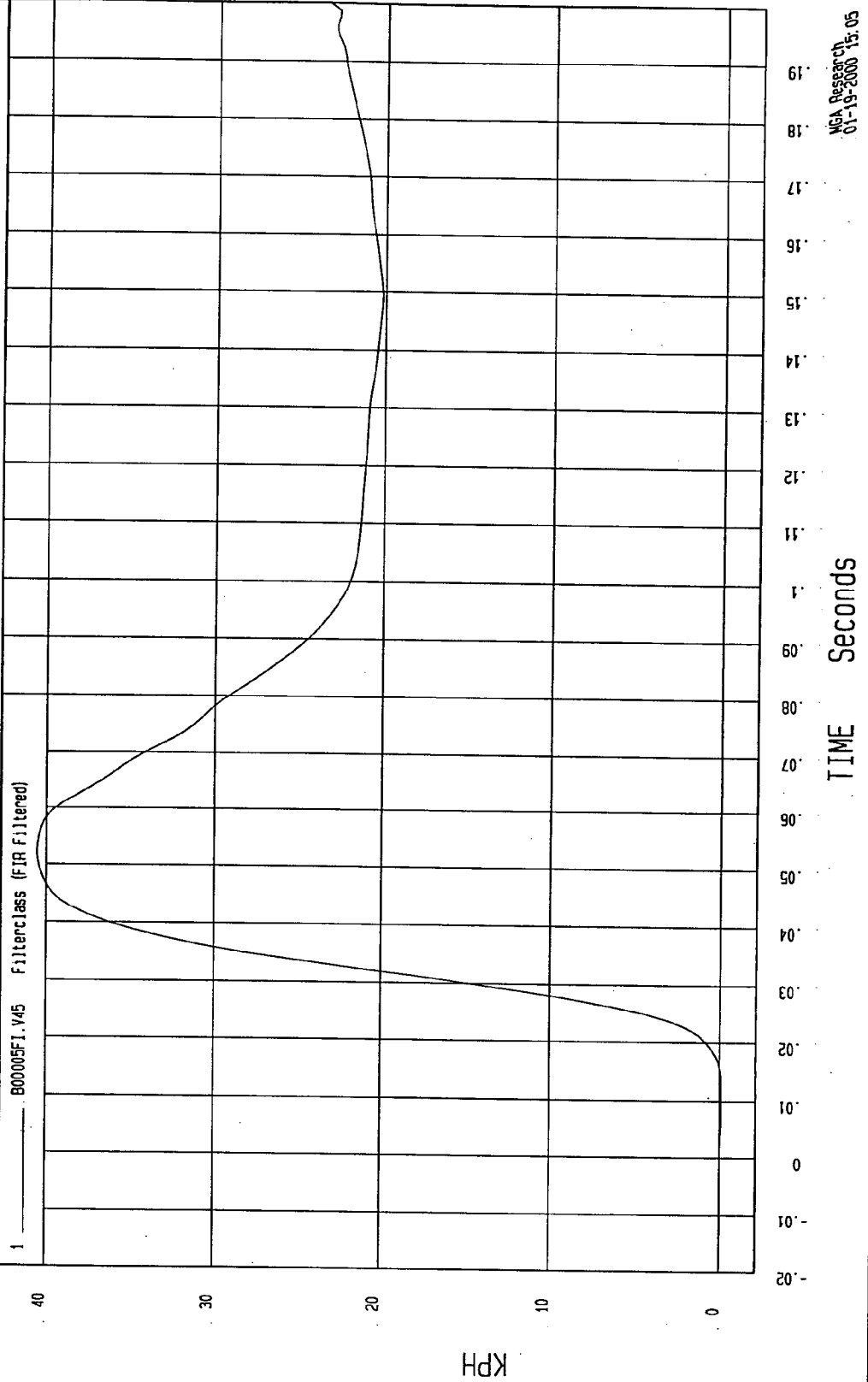
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Speed: 38.5 MPH 62 KPH

Minimum = -9.24E-02 KPH at 8 msec

Maximum = 40.56 KPH at 52 msec

DRIVER PELVIS Y REDUNDANT VELOCITY



NCA Research
01-19-2000 15:05

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

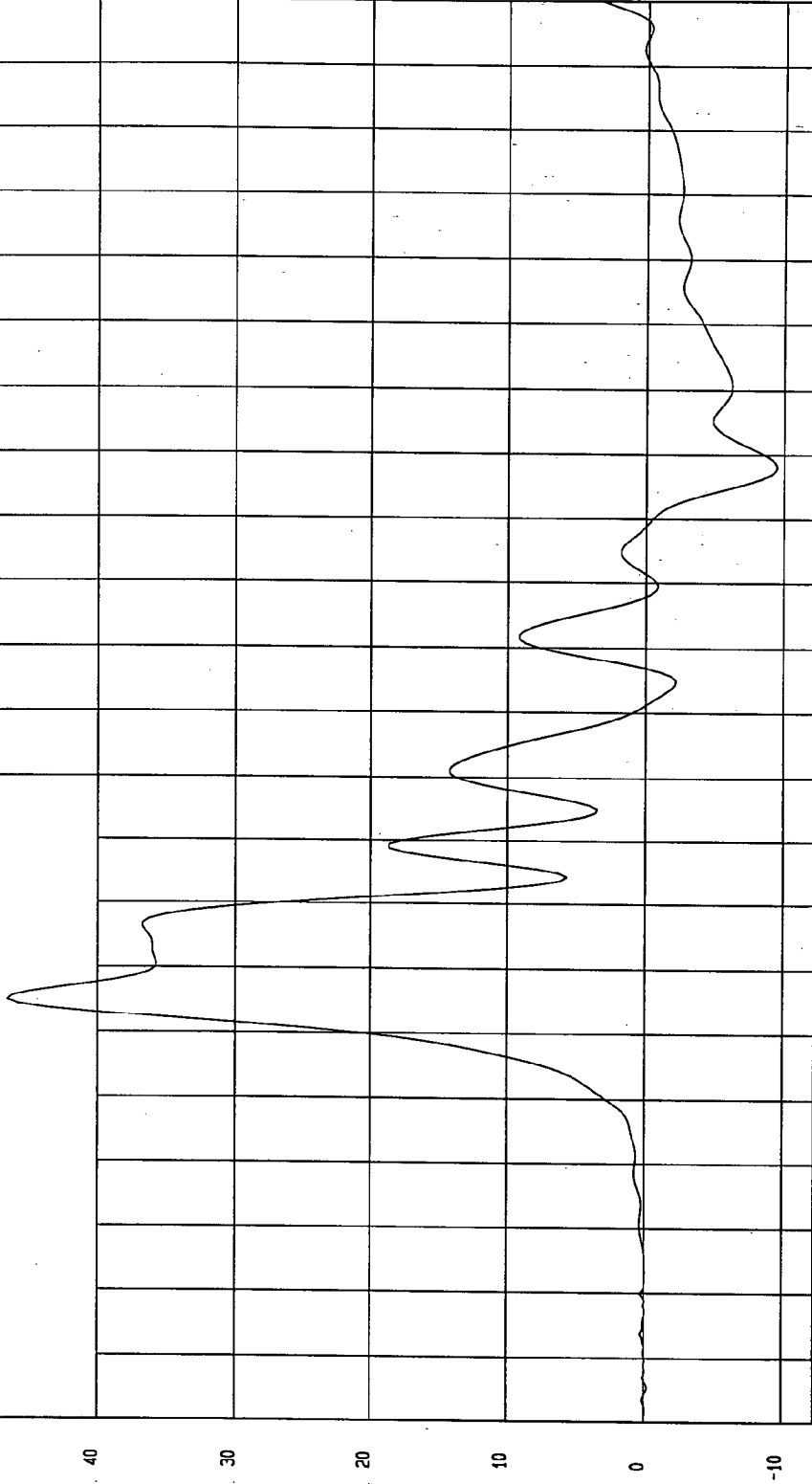
Speed: 38.5 MPH 62 KPH

Minimum = -9.5 G'S at 128 msec

Maximum = 46.54 G'S at 45 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 B00005F1.R46 Filterclass (FIR Filtered)



WGA Research
02-25-2000 11:33

TIME (SECONDS)

G'S

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

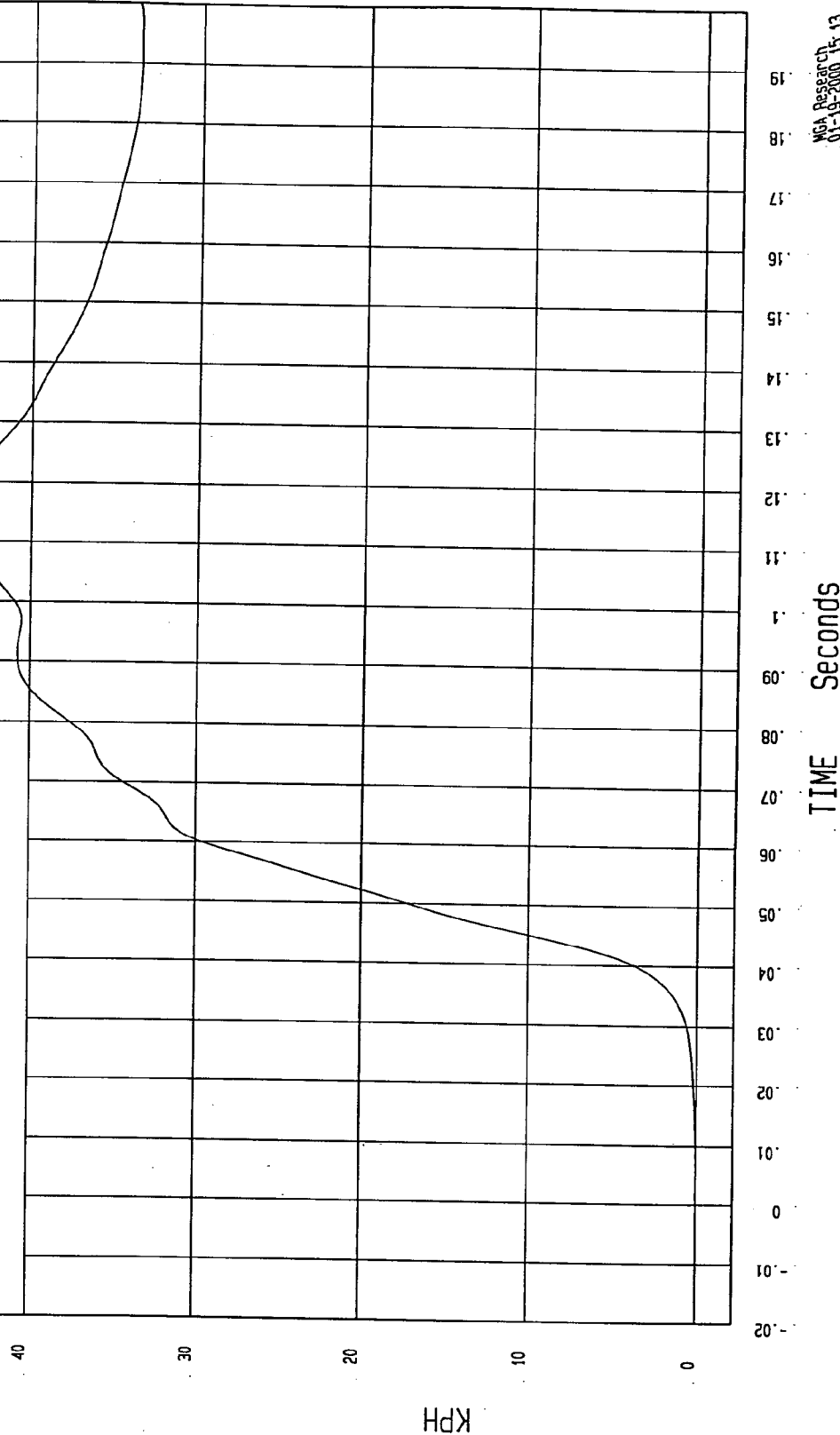
Speed: 38.5 MPH 62 KPH

Minimum = -1.11E-02 KPH at -10 msec

Maximum = 42.8 KPH at 119 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY

1 — 800005F1.V46 Filterclass (FIR Filtered)

NCA Research
01-19-2000 15:13

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

Speed: 38.5 MPH 62 KPH

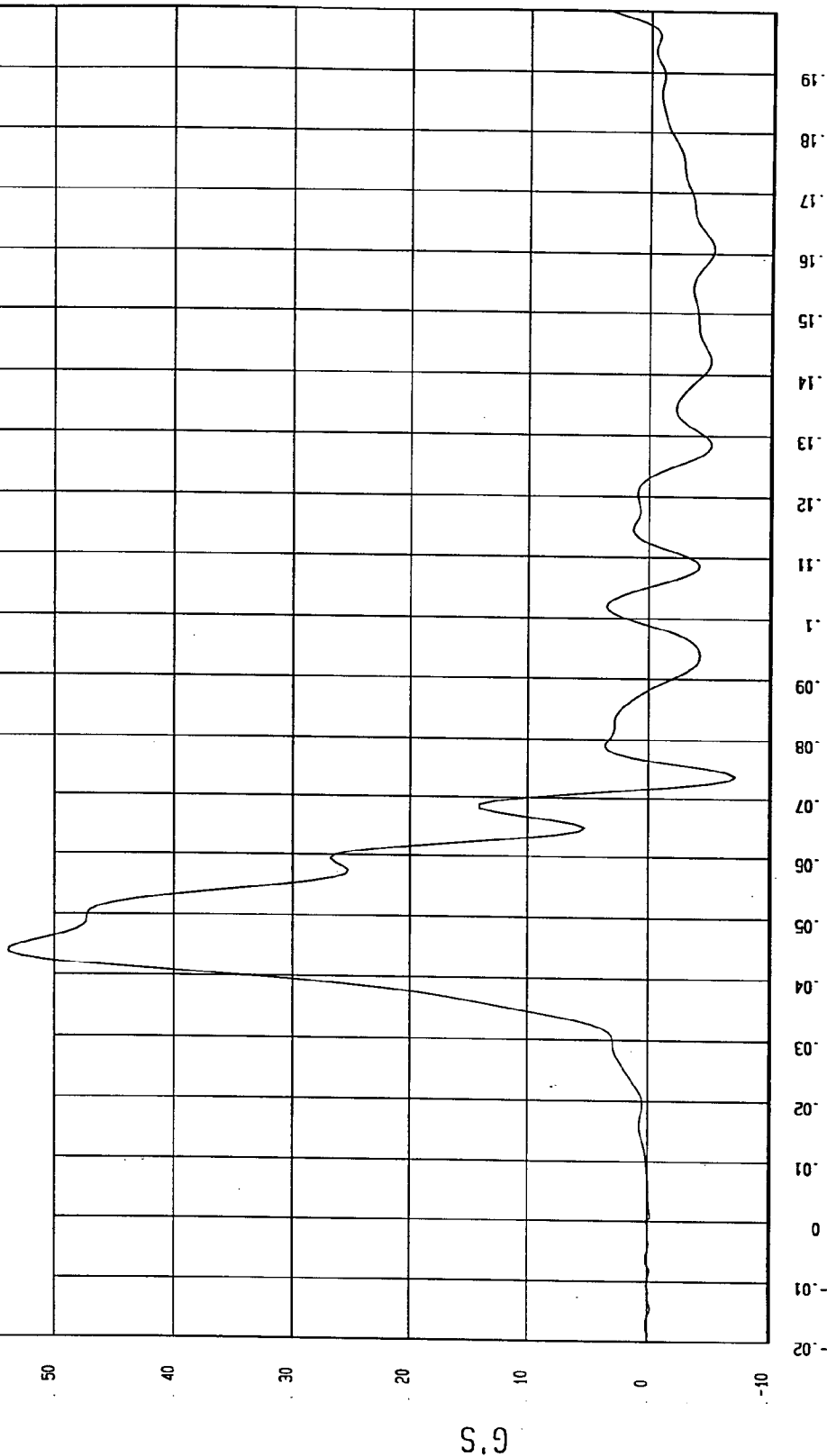
COMPONENT: 2000 TOYOTA AVALON (CY5102)

Maximum = 53.94 G'S at 44 msec

Minimum = -7.12 G'S at 74 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 800005F1.R47 Filterclass (FIR Filtered)

M&A Research
01-19-2000 15:16

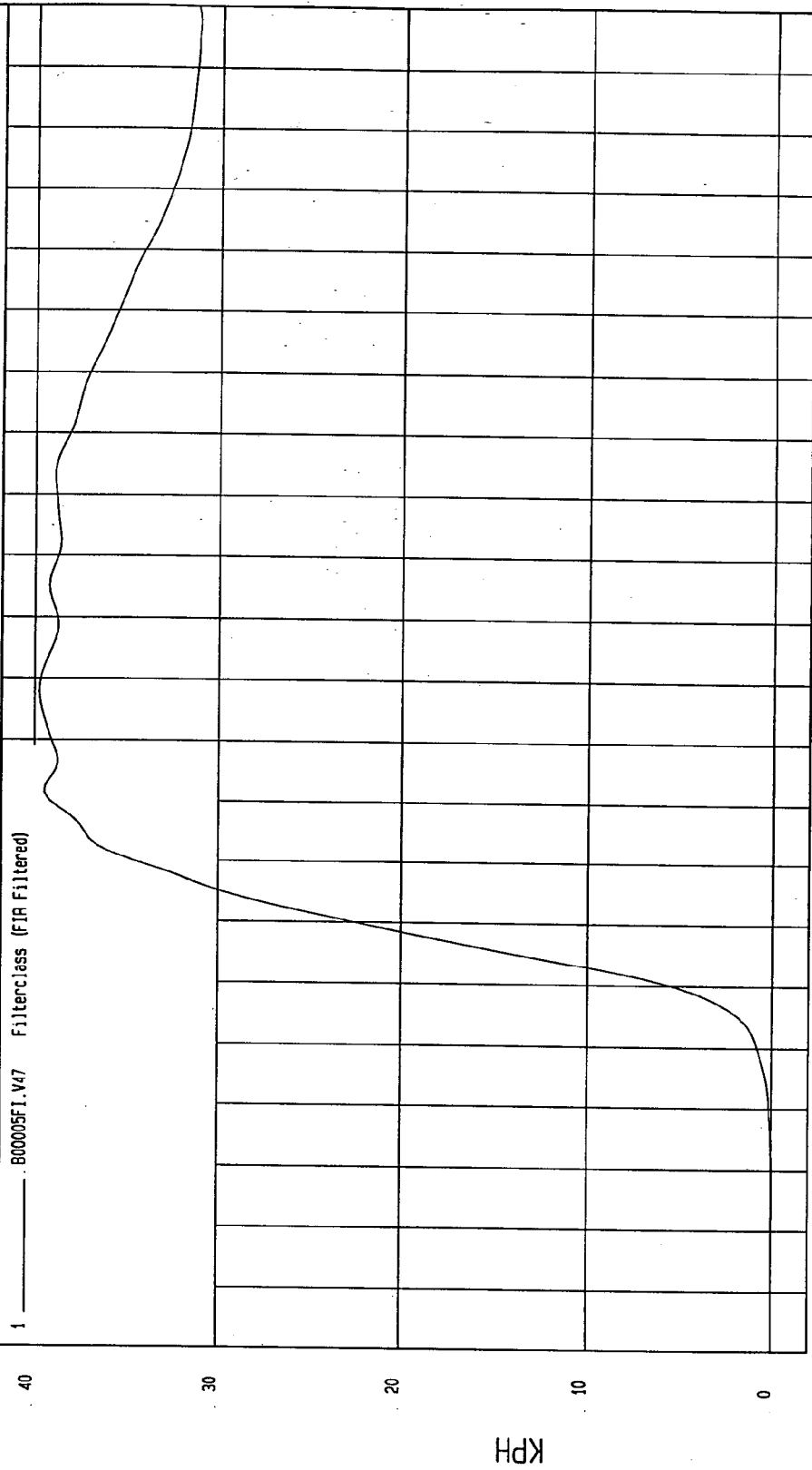
TIME (SECONDS)

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -.02 KPH at 7 msec Maximum = 39.75 KPH at 88 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY



MGA Research
01-19-2000 15:13

TIME Seconds

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

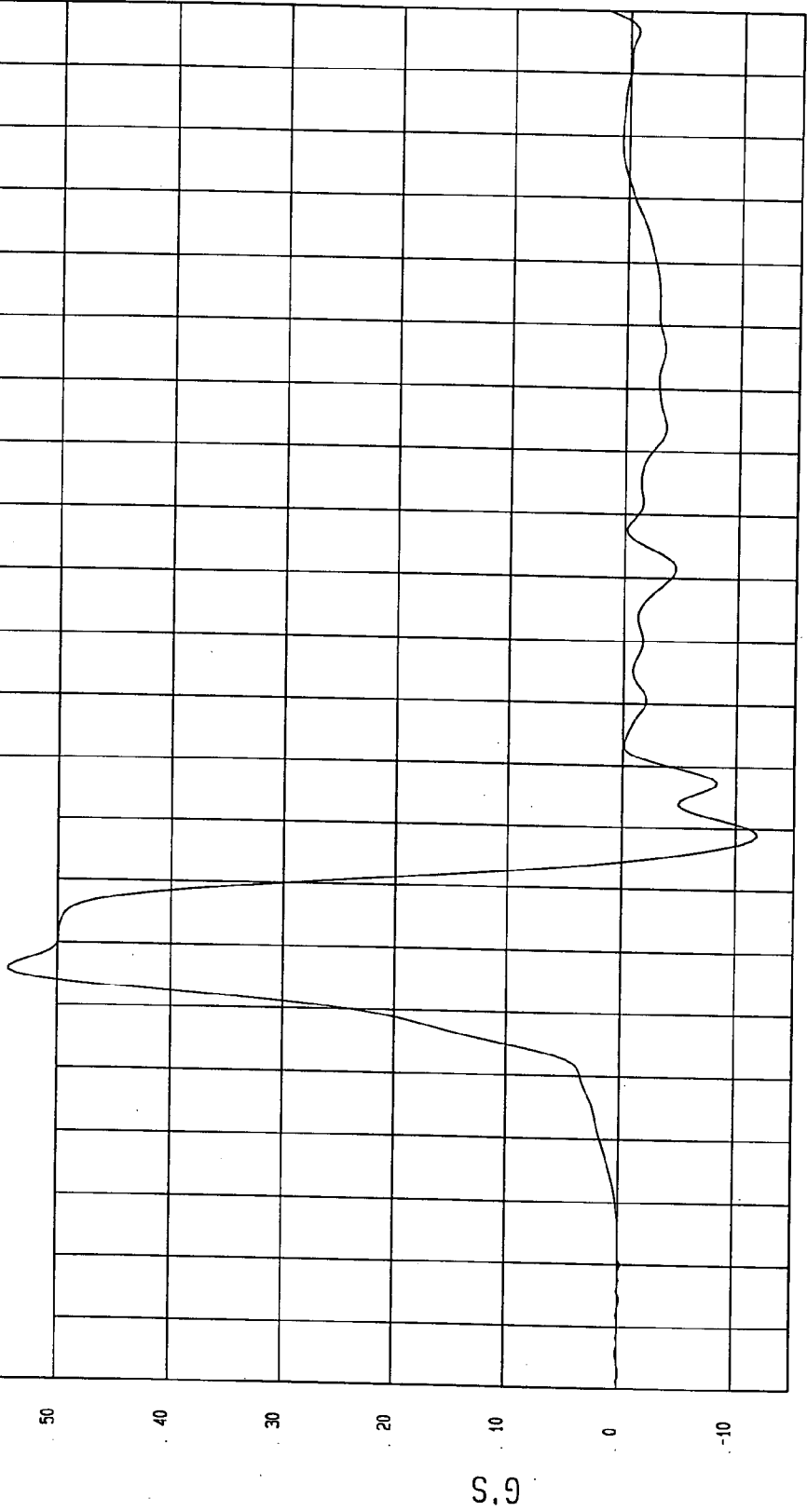
Speed: 38.5 MPH 62 KPH

Minimum = -11.89 G'S at 69 msec

Maximum = 54.36 G'S at 46 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 B00005F1.R48 Filterclass (FIR Filtered)



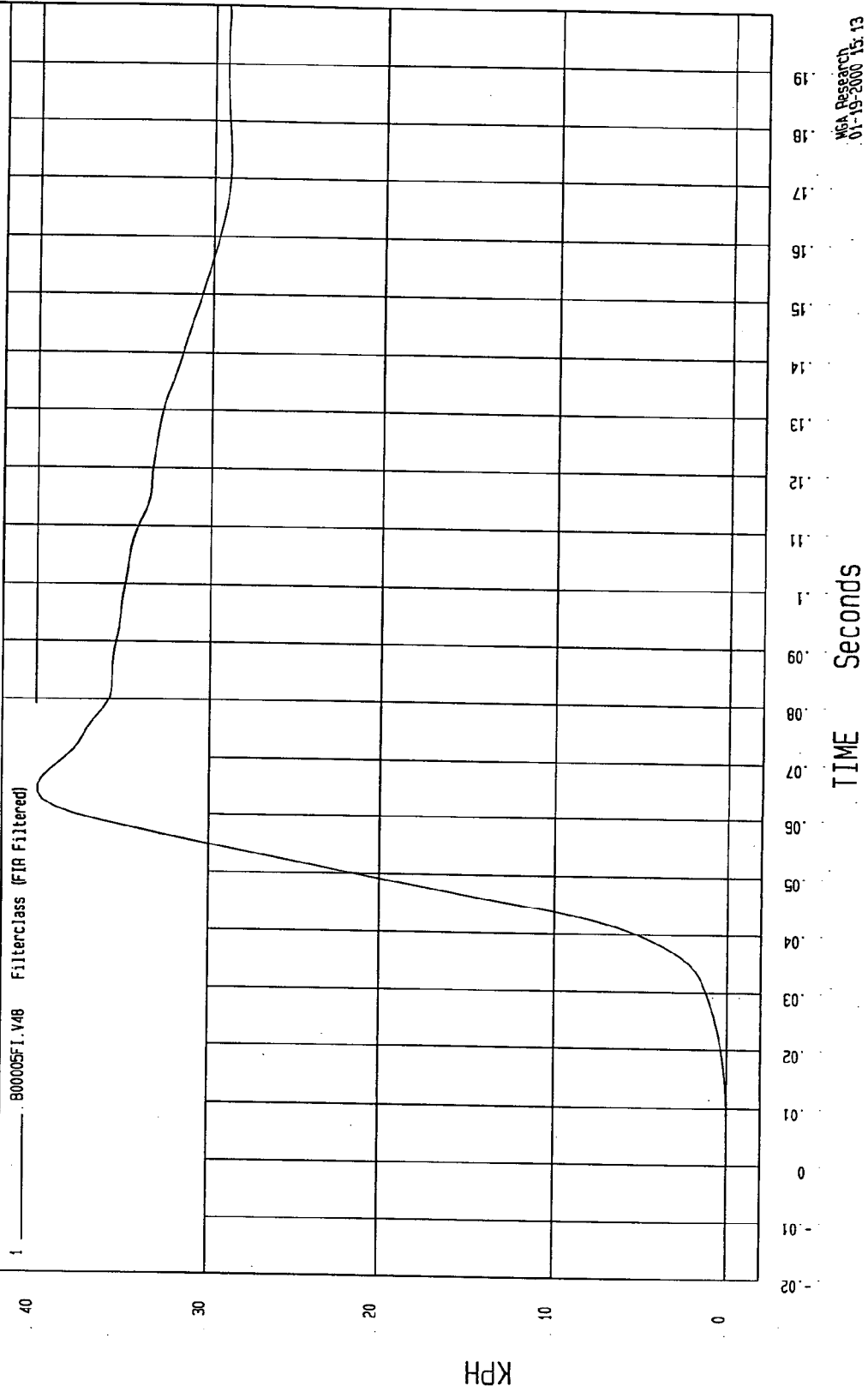
NSA Research
01-19-2000 15:16

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -5.13E-03 KPH at -16 msec Maximum = 39.93 KPH at 64 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY



WCA Research
01-19-2000 15:13

TEST: FMVSS 214 INDICANT

TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102)

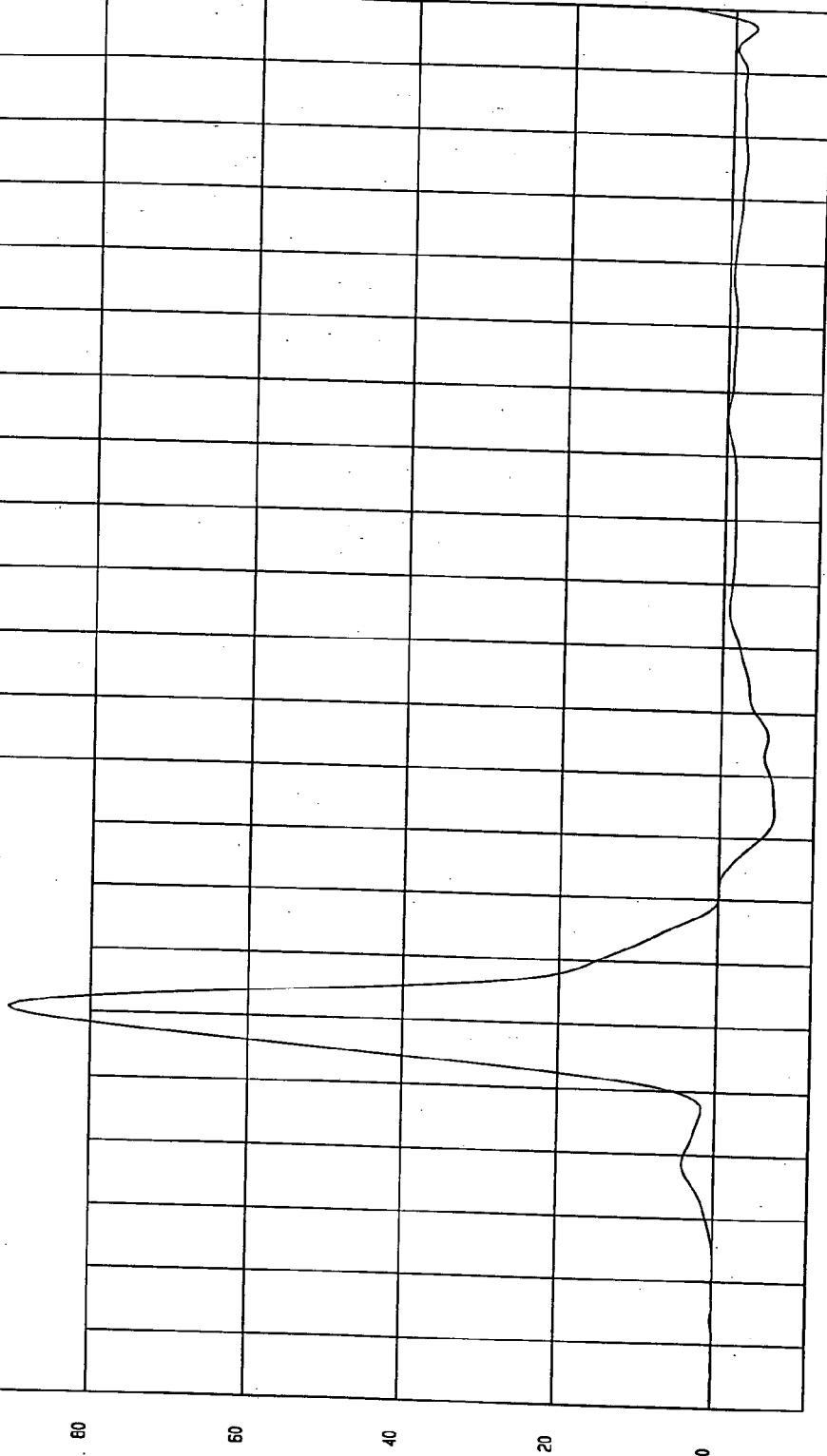
Speed: 38.5 MPH 62 KPH

Minimum = -6.88 G'S at 74 msec

Maximum = 90.27 G'S at 41 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 800005F1.R49 Filterclass (FIR Filtered)



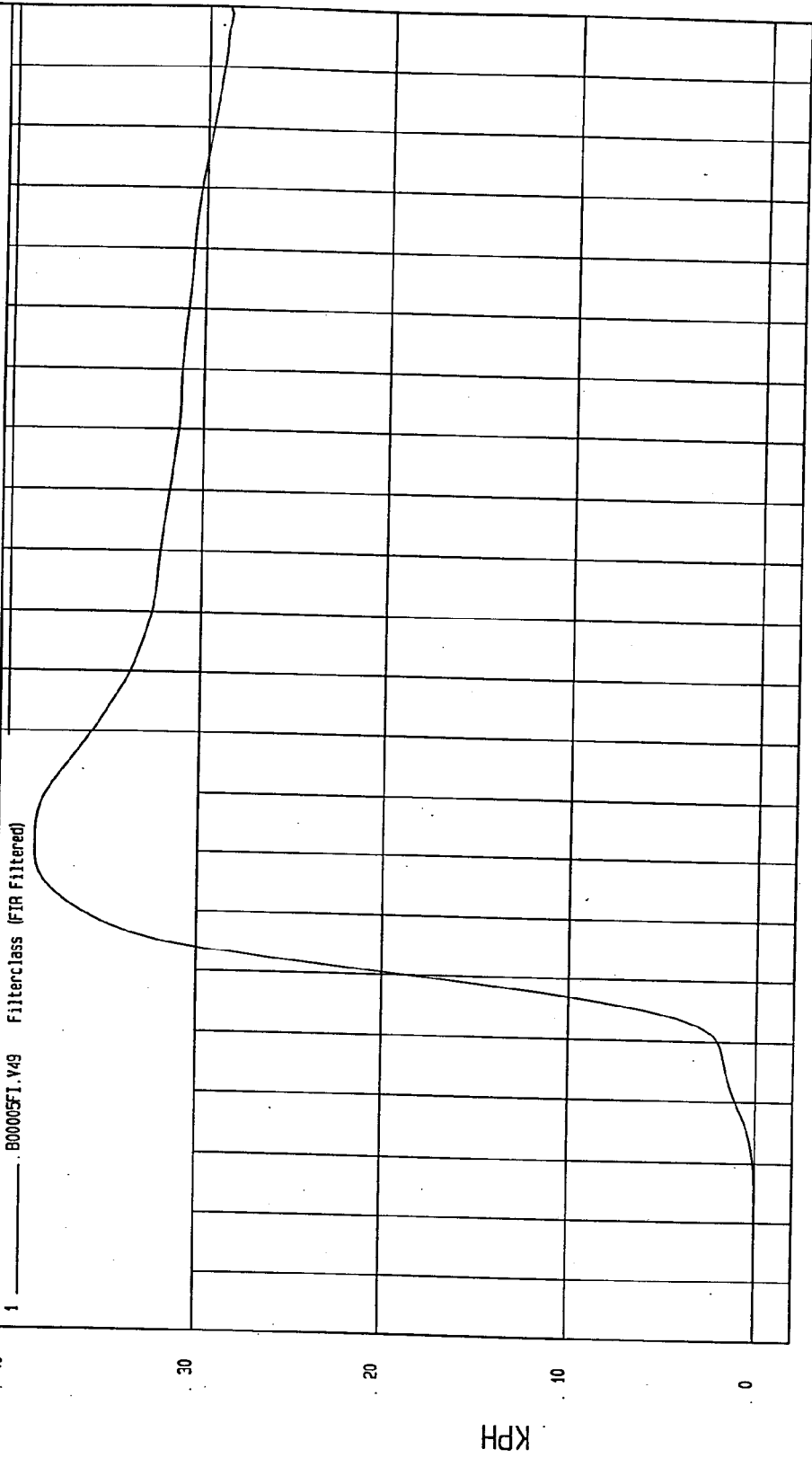
MCA Research
01-19-2000 15:16

TEST: FMVSS 214 INDICANT TEST DATE: 01-19-2000

COMPONENT: 2000 TOYOTA AVALON (CY5102) Speed: 38.5 MPH 62 KPH

Minimum = -9.79E-03 KPH at -8 msec Maximum = 38.55 KPH at 60 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY



MGA Research
01-19-2000 15:13

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

SUMMARY
SIDE PRE & POST-TEST CALIBRATION
CONFIGURED TO LEFT SIDE IMPACT

Test Date: January 19, 2000Technician: Tim MichnayPre-Test Calibration Date: January 18, 2000Post-Test Calibration Date: January 24, 2000

Test Parameter	Specification	Dummy Serial No: 036		Dummy Serial No: 037	
		Pre-Test	Post-Test	Pre-Test	Post-Test
SH-Seated Height (mm)	889 - 909	902	902	903	903
RH-Rib Height (mm)	501 - 521	507	507	510	510
HP-Hip Pivot Height (mm)	99 ref.	99	99	99	99
RD-Rib from Back Line (mm)	229 - 241	235	235	237	237
KV-Knee Pivot from Back Line (mm)	511 - 526	519	519	522	522
SW-Knee Pivot to Floor (mm)	490 - 505	494	494	493	493
HW-Hip Width (mm)	356 - 391	370	370	378	378
Thorax Impacts					
Temperature (°C)	18.9 - 25.5	21.0	21.0	21.0	21.0
Relative Humidity (%)	10 - 70	22	21	22	22
Probe Speed (m/s)	4.27 - 4.33	4.32	4.27	4.30	4.29
Upper Rib (g's)	37 - 46	43	44	45	46
Lower Rib (g's)	37 - 46	45	46	44	43
Lower Spine (g's)	15 - 22	20	20	21	20
Pelvis Impact					
Temperature (°C)	18.9 - 25.5	21.0	21.0	21.0	21.0
Relative Humidity (%)	10 - 70	22	21	22	22
Probe Speed (m/s)	4.27 - 4.33	4.30	4.29	4.27	4.28
Pelvis (g's)	40 - 60	50	45	47	44

REMARKS:

PRE-TEST CERTIFICATION DATA

Dummy Serial Number: 036

Calibration Test Results Summary

Dummy Serial Number: 036

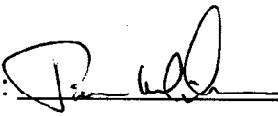
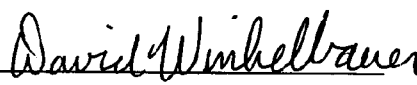
Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NO.: 036DATE OF VERIFICATION: January 18, 2000

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	902
RH - Rib Height (mm)	501 - 521	507
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	235
KV - Knee Pivot From Back Line (mm)	511 - 526	519
SW - Knee Pivot to Floor (mm)	490 - 505	494
HW - Hip Width (mm)	356 - 391	370

TECHNICIAN: APPROVED BY: 

MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

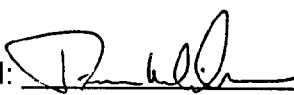
DATE: January 18, 2000

DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00042

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
PROBE SPEED (m/s)	4.27 - 4.33	4.32
UPPER RIB (g's)	37 - 46 g's	43
LOWER RIB (g's)	37 - 46 g's	45
LOWER SPINE (g's)	15 - 22 g's	20

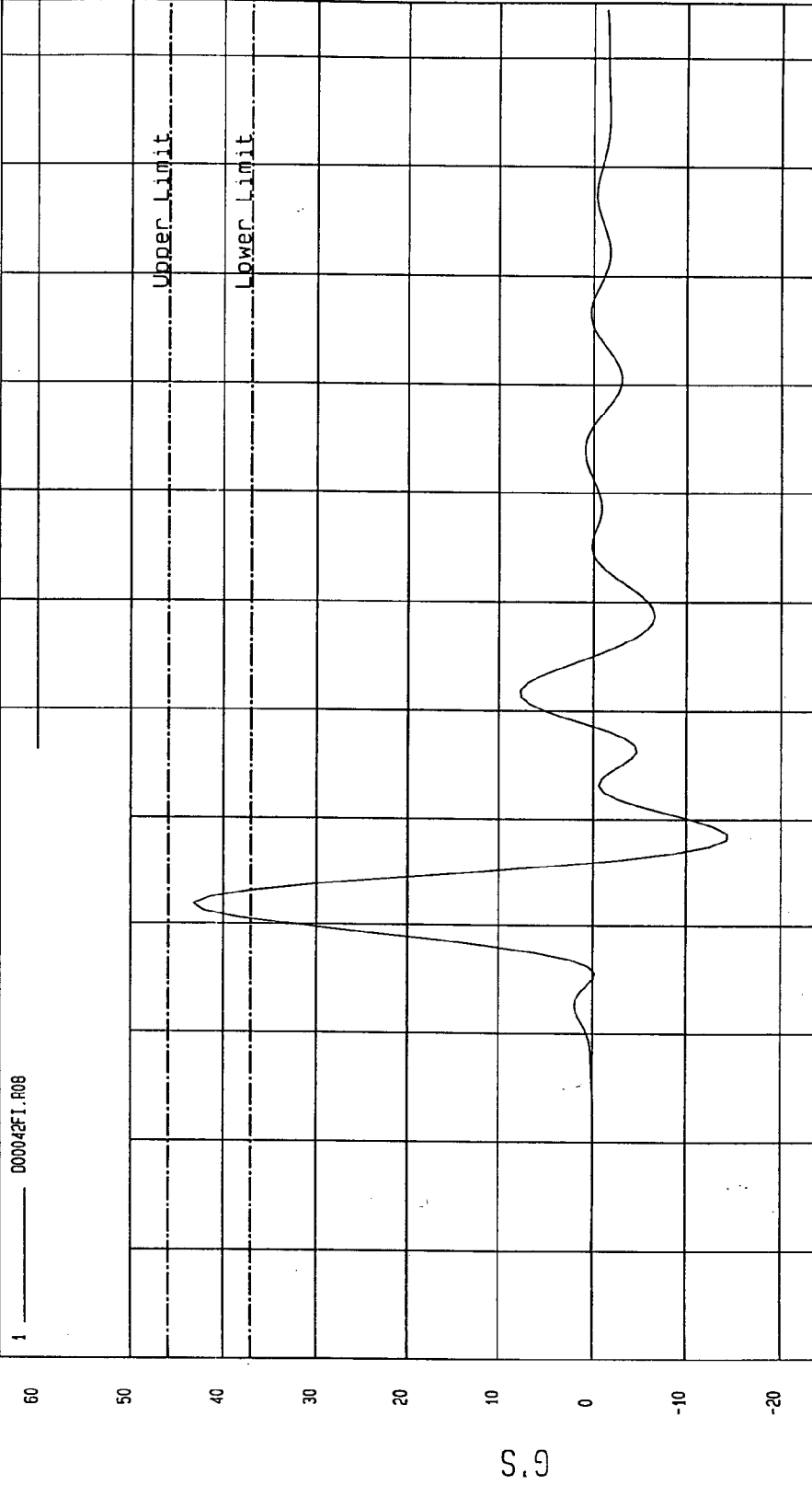
TEST MEETS SPECIFICATIONS

TECHNICIAN: 

APPROVED BY: David Winkelbauer

TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-18-2000 - 10:36:36
 COMPONENT: Dummy # 036 Velocity: 14.159 FT/SEC 4.32 M/SEC
 Minimum = -14.23 G'S at 48.7 msec Maximum = 43.29 G'S at 41.8 msec

UPPER RIB ACCELERATION



WGA Research
 01-25-2000 10:13

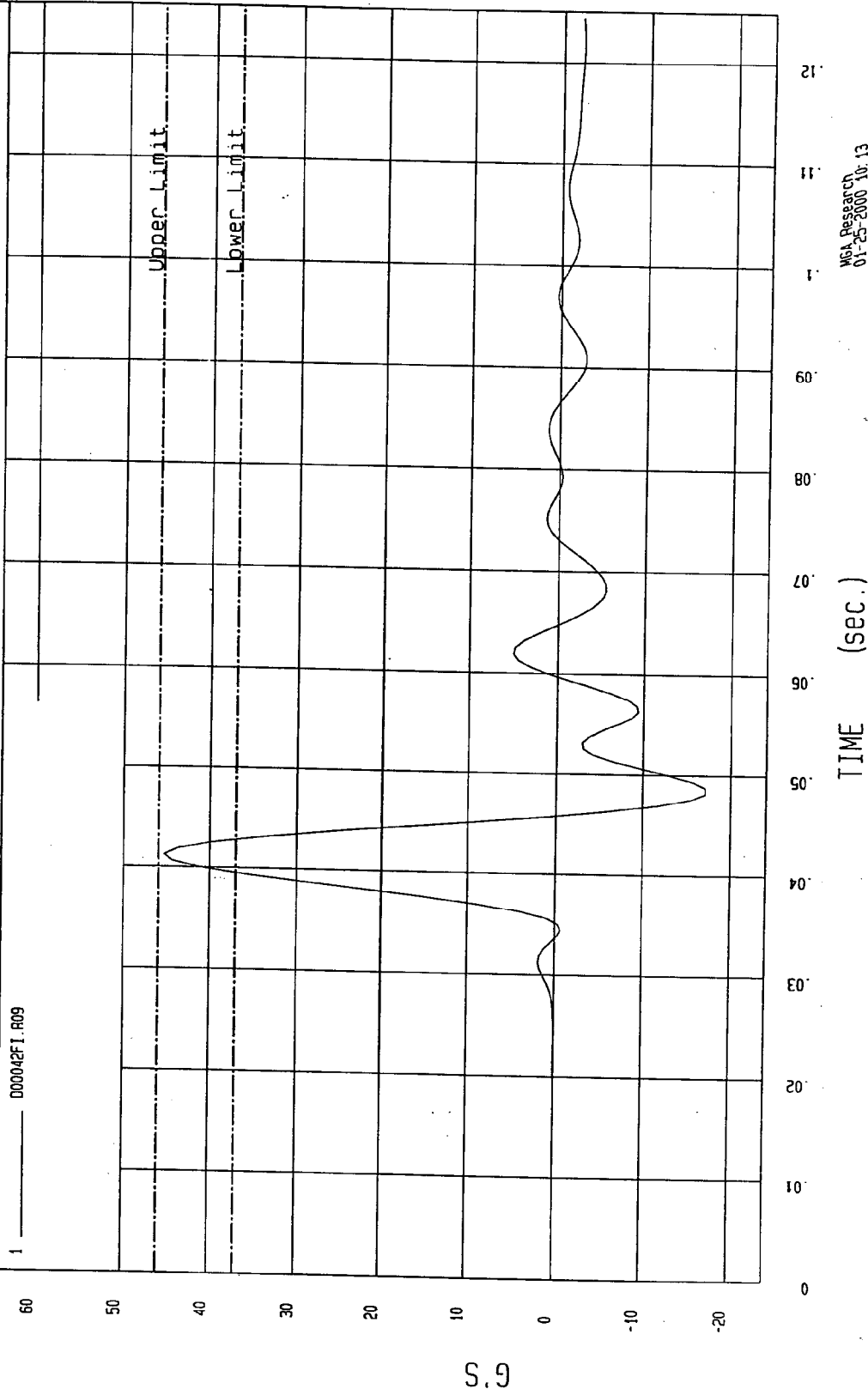
TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-18-2000 - 10:38:08

COMPONENT: Dummy # 036 Velocity: 14.159 FT/SEC 4.32 M/SEC

Minimum = -17.09 G'S at 48.1 msec

Maximum = 45.37 G'S at 41.2 msec

LOWER RIB ACCELERATION



NSA Research
01-25-2000 10:13

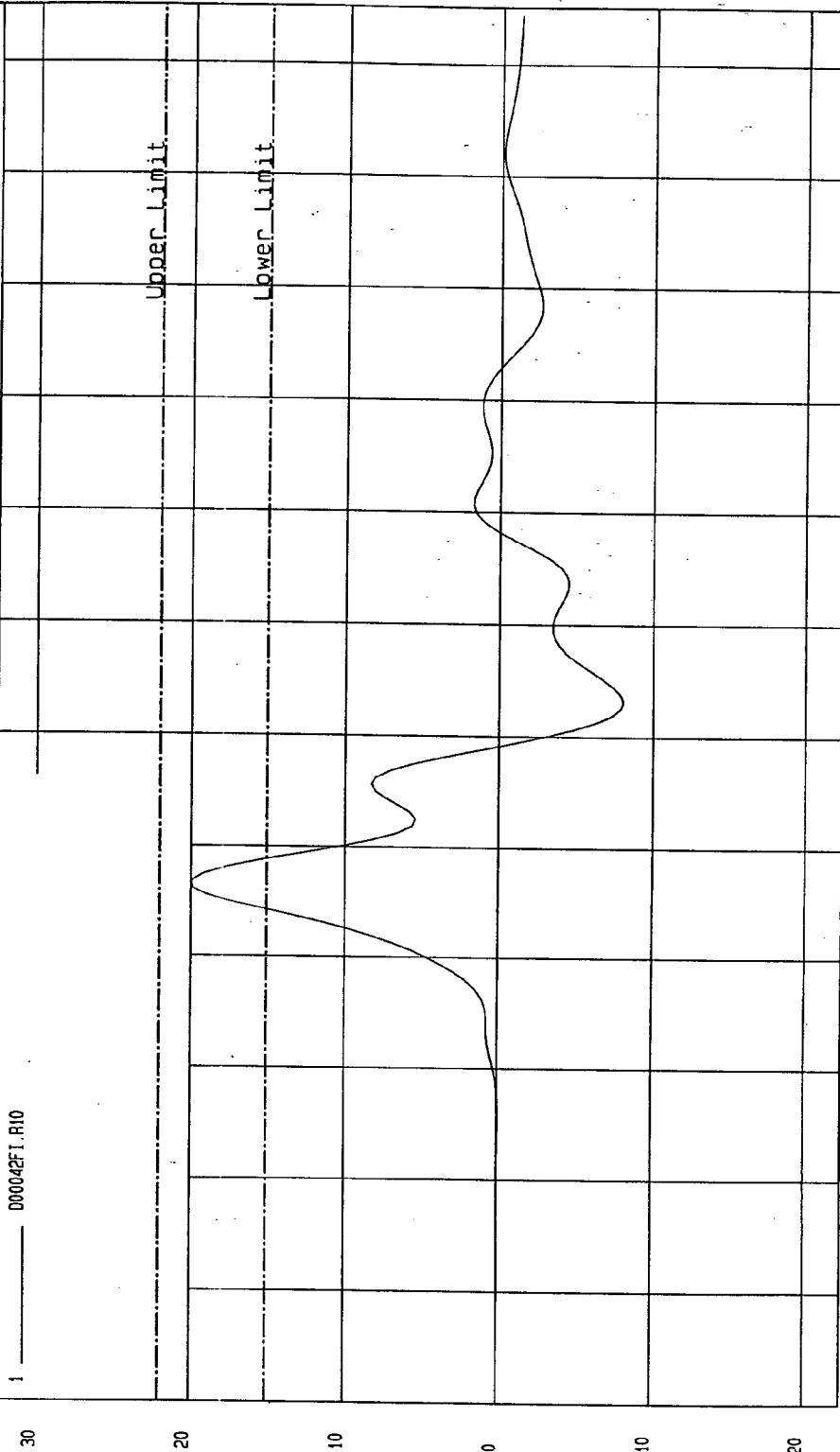
TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-18-1900 - 10:07:15

COMPONENT: Dummy # 036 Velocity: 14.159 FT/SEC 4.32 M/SEC

Minimum = -8.03 G'S at 63.1 msec
Maximum = 19.99 G'S at 45.8 msec

LOWER SPINE ACCELERATION

1 ——— D00042FT.R10



TIME (sec.)

MSA Research
01-18-2000 10:38

MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

DATE: January 18, 2000

DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00043

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
PROBE SPEED (m/s)	4.27 - 4.33	4.30
PELVIS ACCELERATION (g's)	40 - 60	50

TEST MEETS SPECIFICATIONS

TECHNICIAN: 

APPROVED BY: David Winkelbauer

TEST: Dummy Calibration - Pelvis Impact TEST DATE: 01-18-1900 - 10:13:04

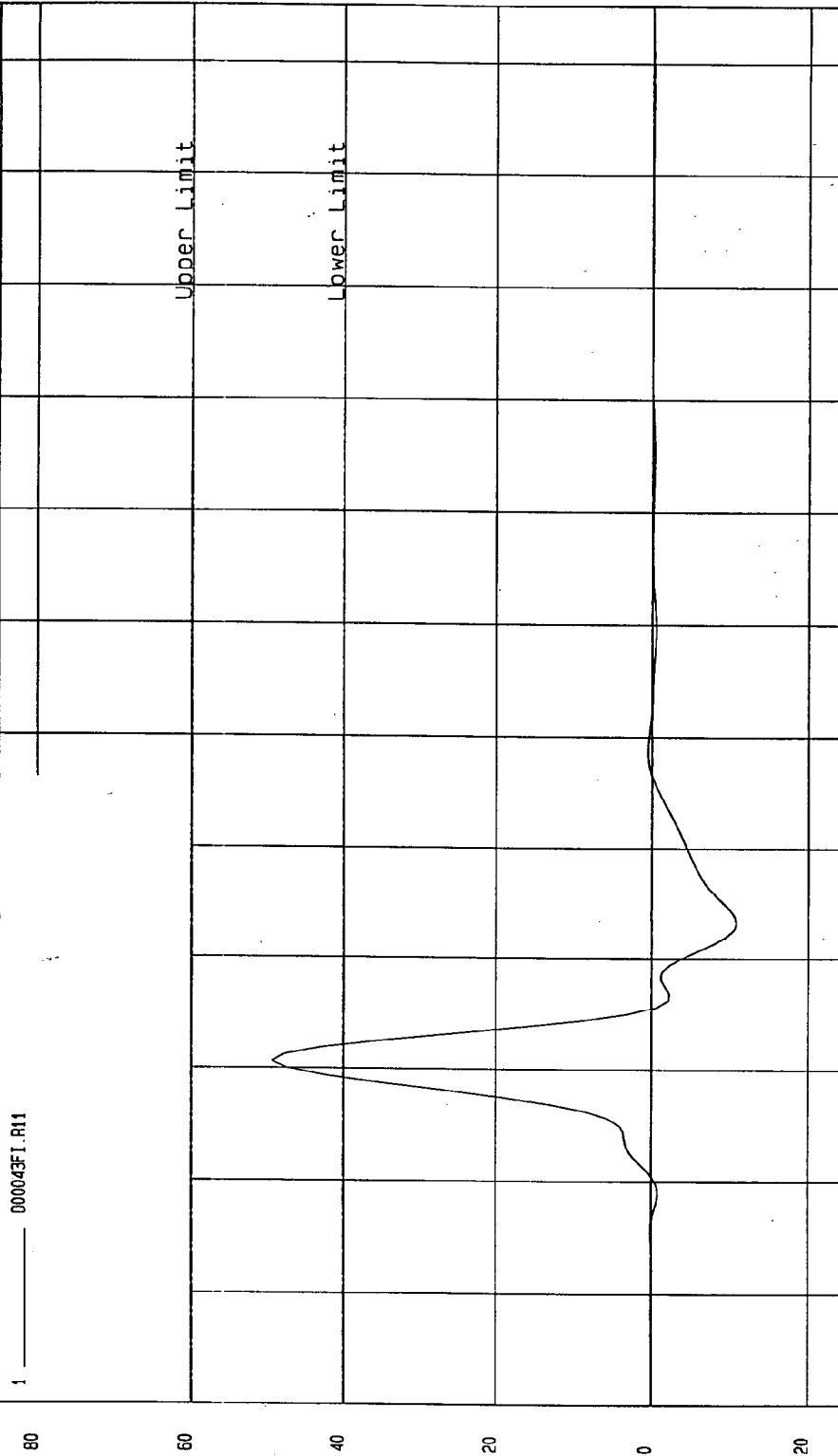
COMPONENT: Dummy # 036 Velocity: 14.106 FT/SEC 4.3 M/SEC

Minimum = -10.78 G'S at 43.1 msec

Maximum = 49.52 G'S at 30.6 msec

PELVIS ACCELERATION

1 ——— 000043FT.R11

MCA Research
01-18-2000 10:39

MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

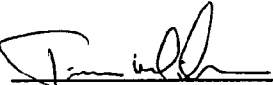
DATE: January 14, 2000

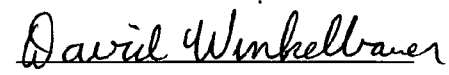
DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00044

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	24
FORCE @ 12.7 mm	104 - 162	149
FORCE @ 19.0 mm	163 - 222	201
FORCE @ 25.4 mm	222 - 280	254
FORCE @ 33 mm	325 - 391	336

TEST MEETS SPECIFICATIONS

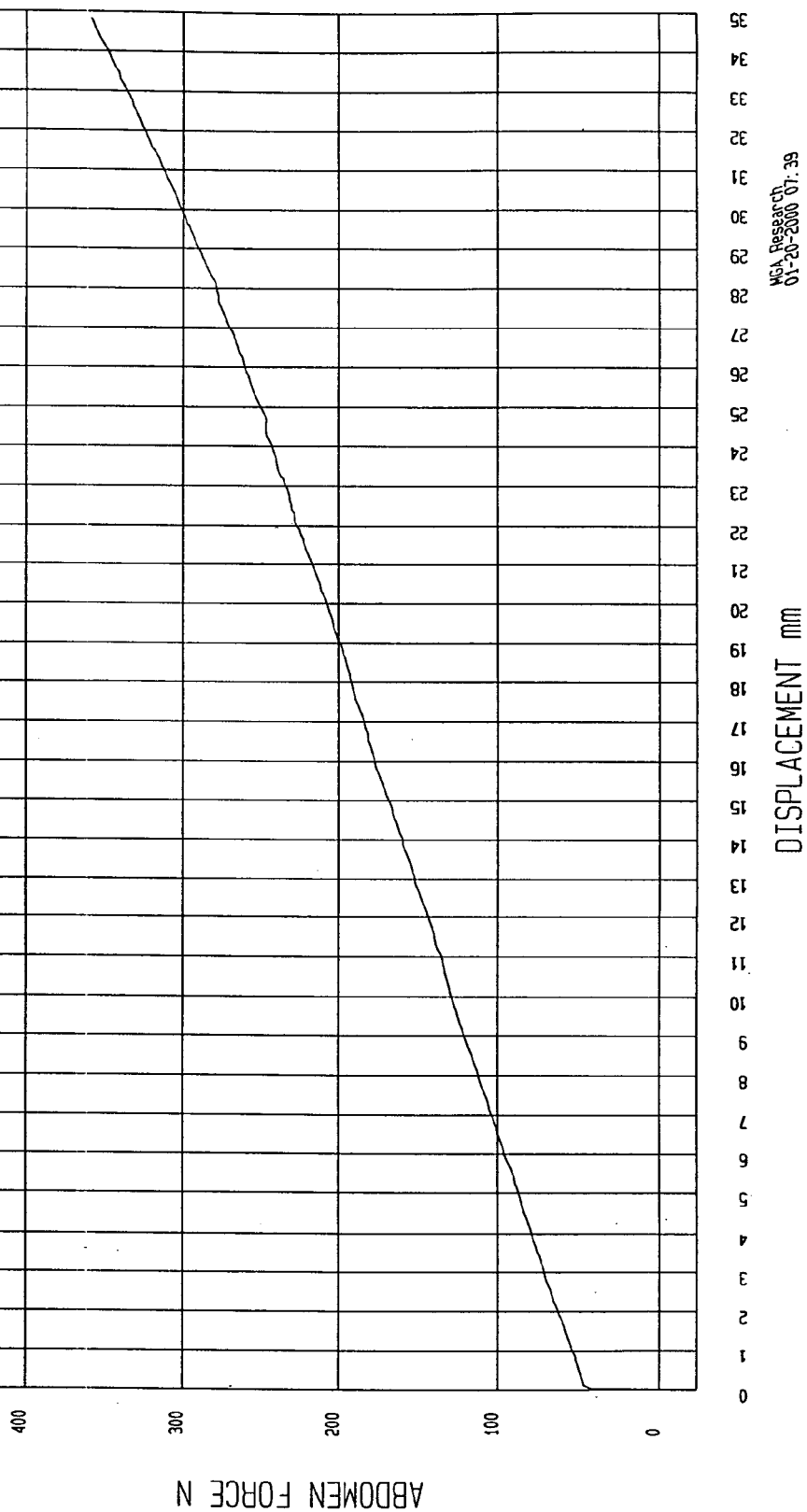
TECHNICIAN: 

APPROVED BY: 

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-14-2000 - 08:47:28

COMPONENT: DUMMY # 036

ABDOMEN FORCE as a function of DISPLACEMENT



WCA Research
01-20-2000 07:39

MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

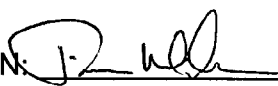
DATE: January 14, 2000

DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00045

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	26
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	104.4
FORCE @ 30°	151.2 - 204.6	173.2
FORCE @ 40°	204.6 - 258.0	234.0
RETURN ANGLE	12° maximum	2

TEST MEETS SPECIFICATIONS

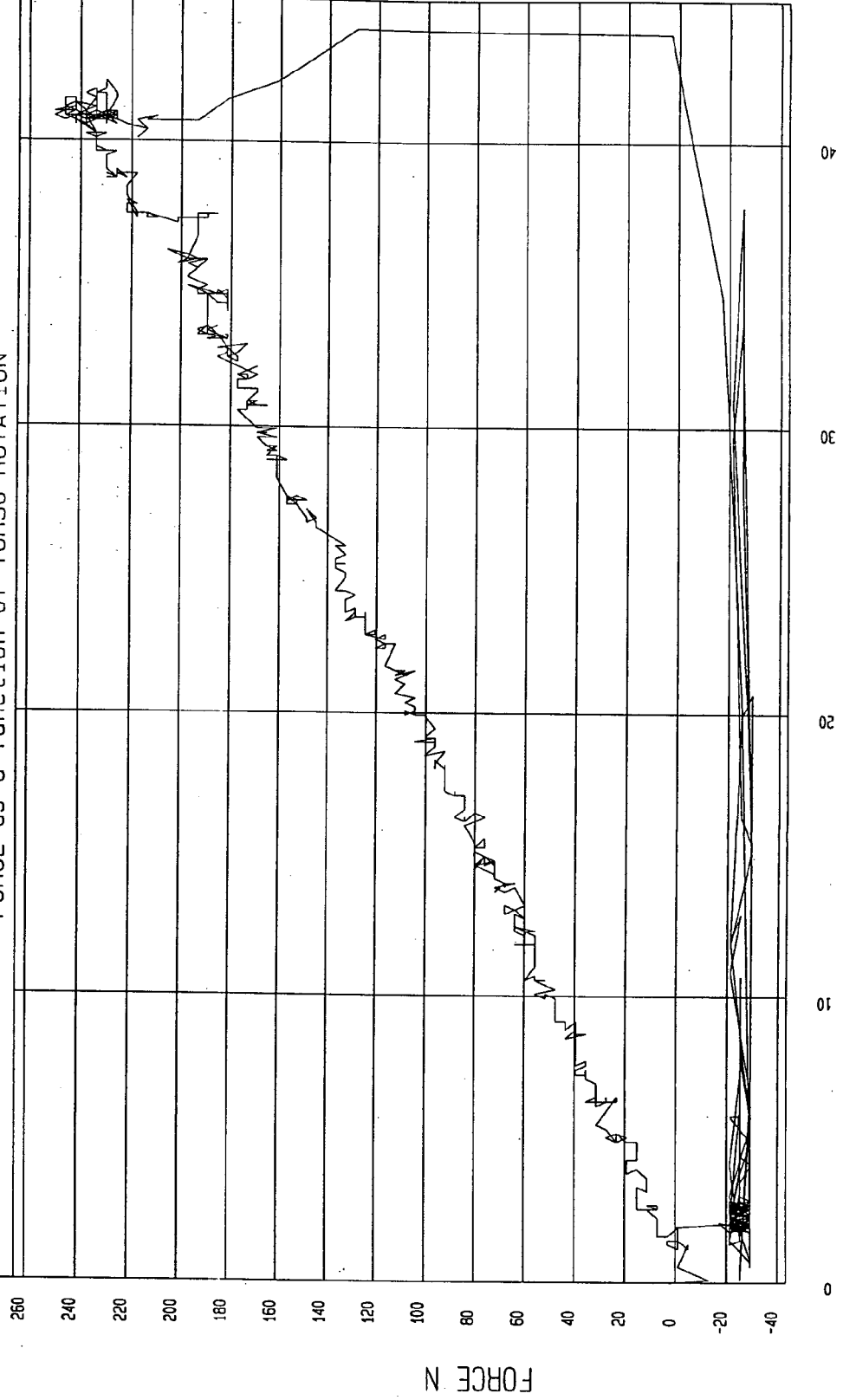
TECHNICIAN: 

APPROVED BY: David Winkelbauer

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-14-2000 - 09:35:13

COMPONENT: DUMMY # 035

FORCE as a function of TORSO ROTATION



PRE-TEST CERTIFICATION DATA

Dummy Serial Number: 037

Calibration Test Results Summary

Dummy Serial Number: 037

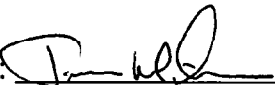
Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NO.: 037DATE OF VERIFICATION: January 18, 2000

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	903
RH - Rib Height (mm)	501 - 521	510
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	237
KV - Knee Pivot From Back Line (mm)	511 - 526	522
SW - Knee Pivot to Floor (mm)	490 - 505	493
HW - Hip Width (mm)	356 - 391	378

TECHNICIAN: APPROVED BY: 

MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

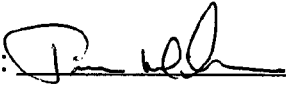
DATE: January 18, 2000

DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00052

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
PROBE SPEED (m/s)	4.27 - 4.33	4.30
UPPER RIB (g's)	37 - 46	45
LOWER RIB (g's)	37 - 46	44
LOWER SPINE (g's)	15 - 22	21

TEST MEETS SPECIFICATIONS

TECHNICIAN: 

APPROVED BY: 

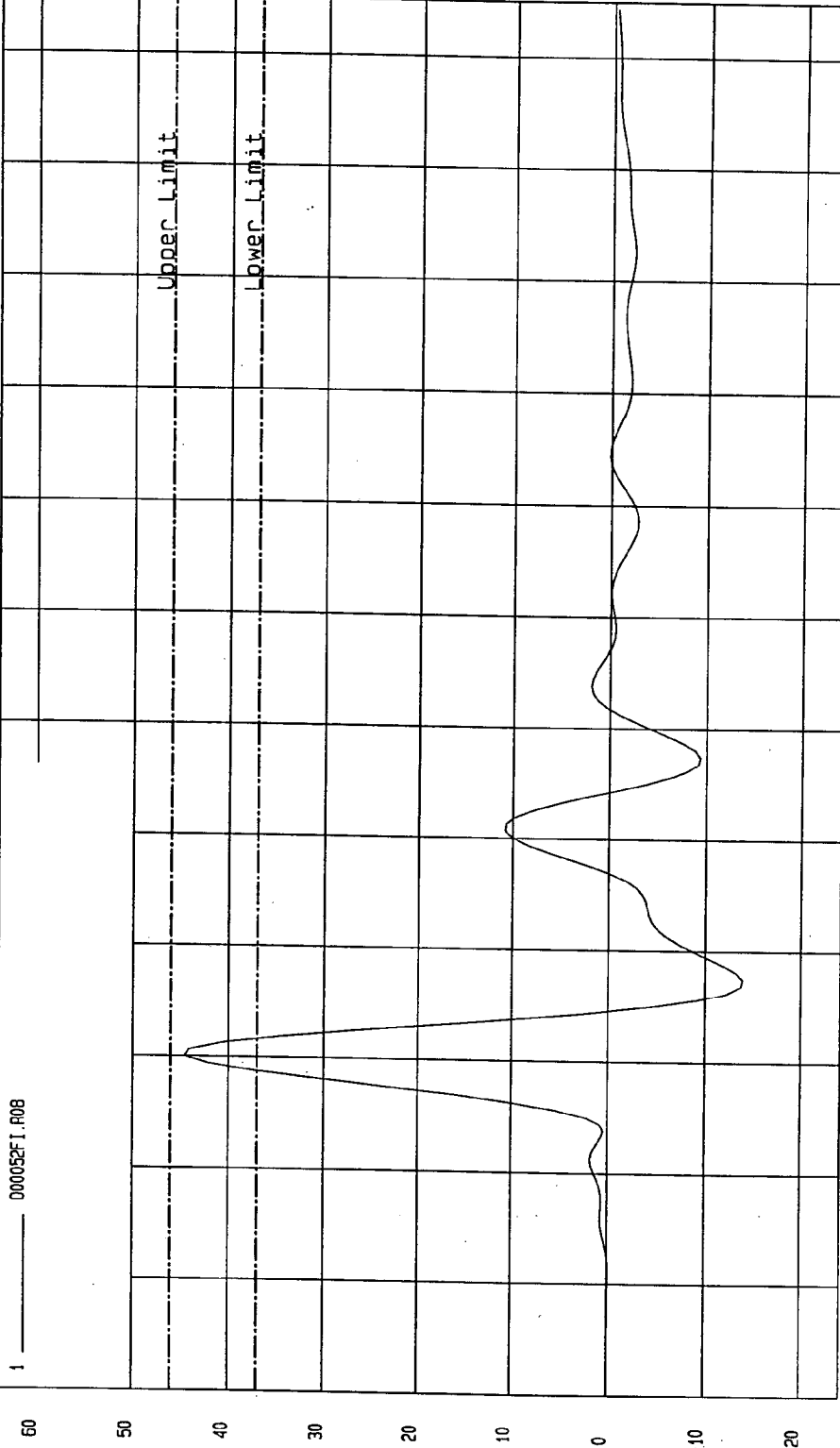
TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-18-2000 - 10:52:10

COMPONENT: Dummy # 037 Velocity: 14.096 FT/SEC 4.3 M/SEC

Minimum = -13.84 G'S at 37.5 msec Maximum = 44.58 G'S at 30 msec

UPPER RIB ACCELERATION

1 ——— 000052FI.R08

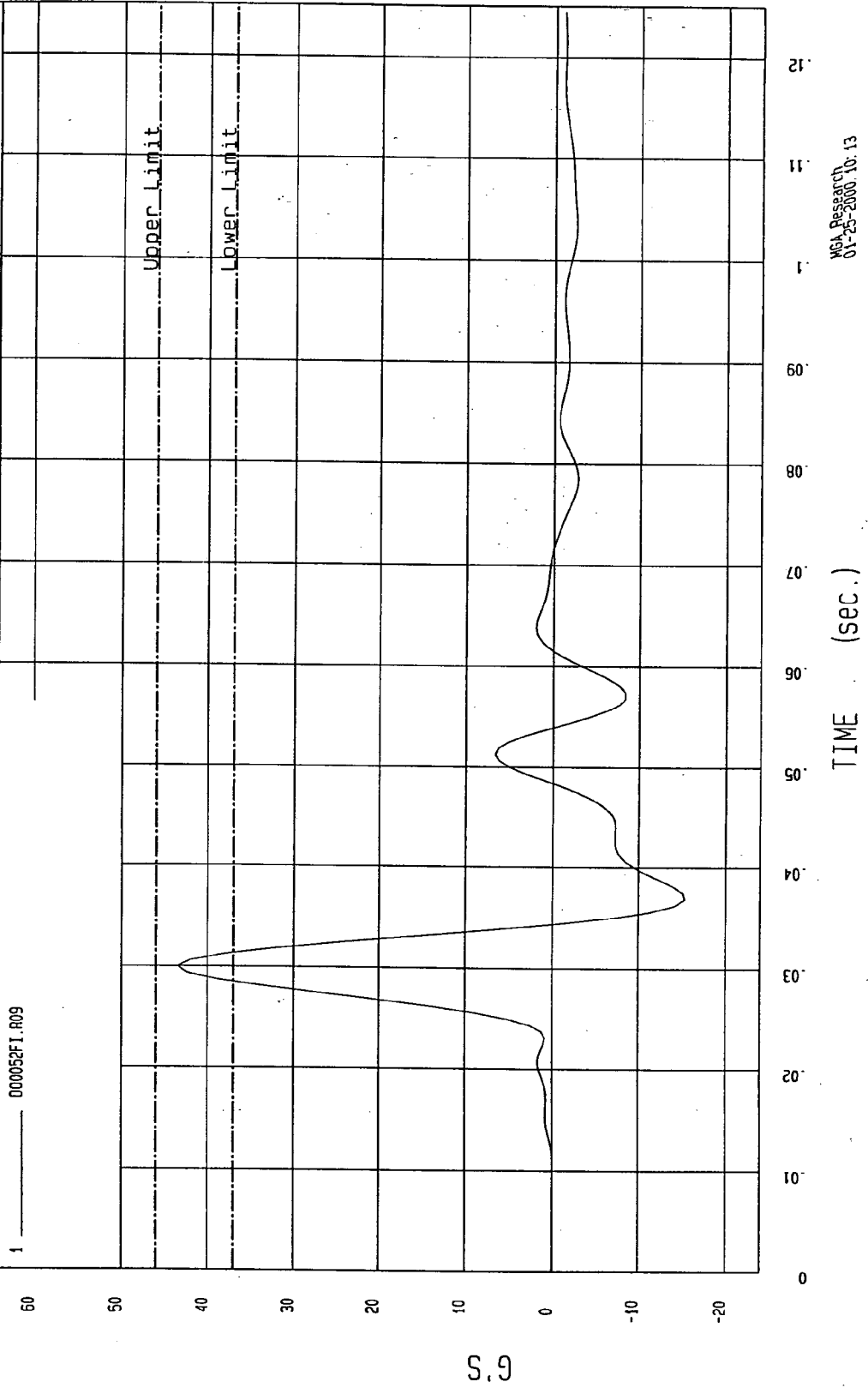


MGA Research
01-25-2000 10:13

TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-18-2000 - 10:52:10
COMPONENT: Dummy # 037 Velocity: 14.096 FT/SEC 4.3 M/SEC

Minimum = -15.13 G'S at 36.8 msec Maximum = 43.53 G'S at 30 msec

LOWER RIB ACCELERATION

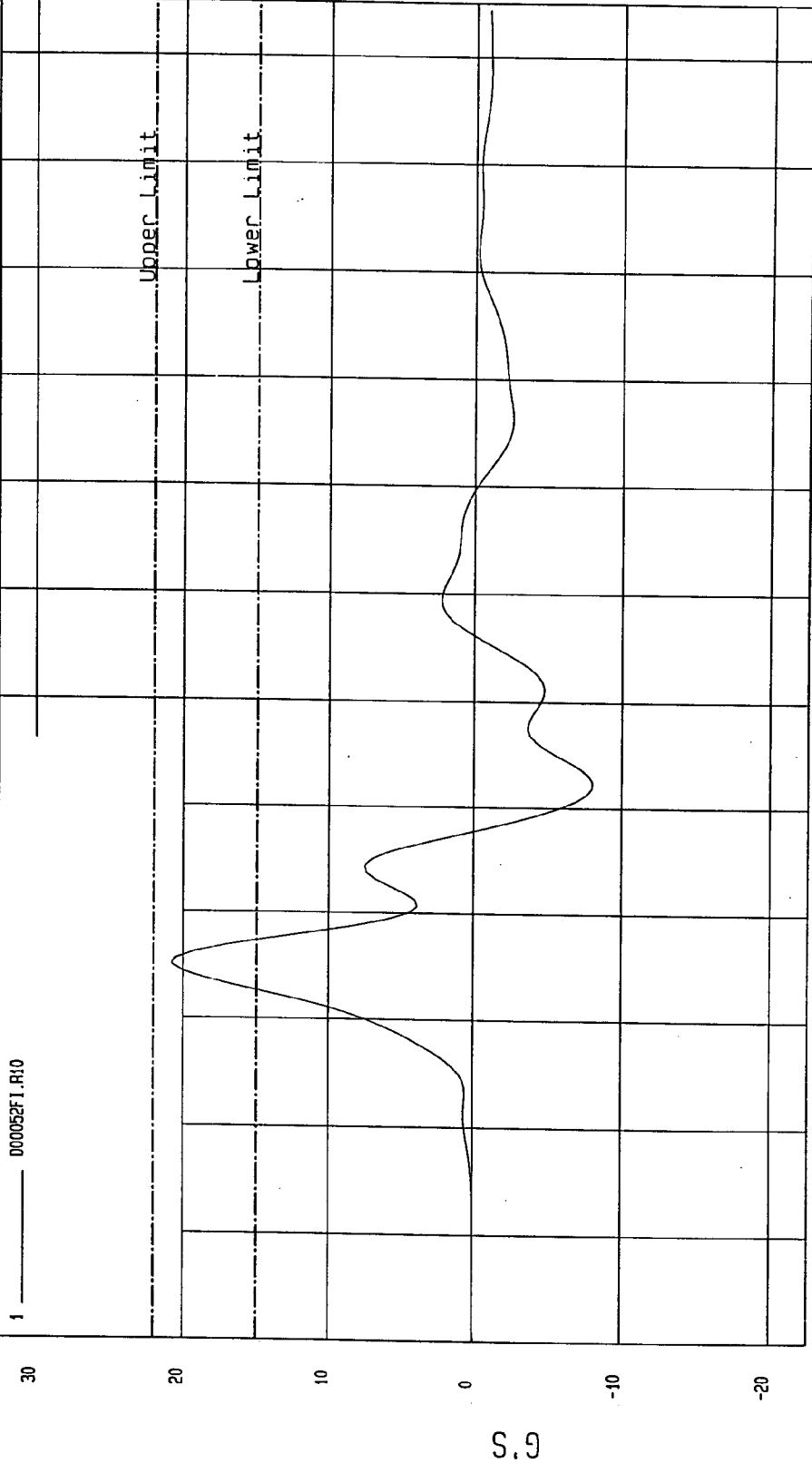


TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-18-2000 - 10:52:10

COMPONENT: Dummy # 037 Velocity: 14.096 FT/SEC 4.3 M/SEC

Minimum = -7.99 G's at 52.5 msec Maximum = 20.78 G's at 35 msec

LOWER SPINE ACCELERATION



MGA Research
01-25-2000 10:13

MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

DATE: January 18, 2000

DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00053

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
PROBE SPEED (m/s)	4.27 - 4.33	4.27
PELVIS ACCELERATION (g's)	40 - 60	47

TEST MEETS SPECIFICATIONS

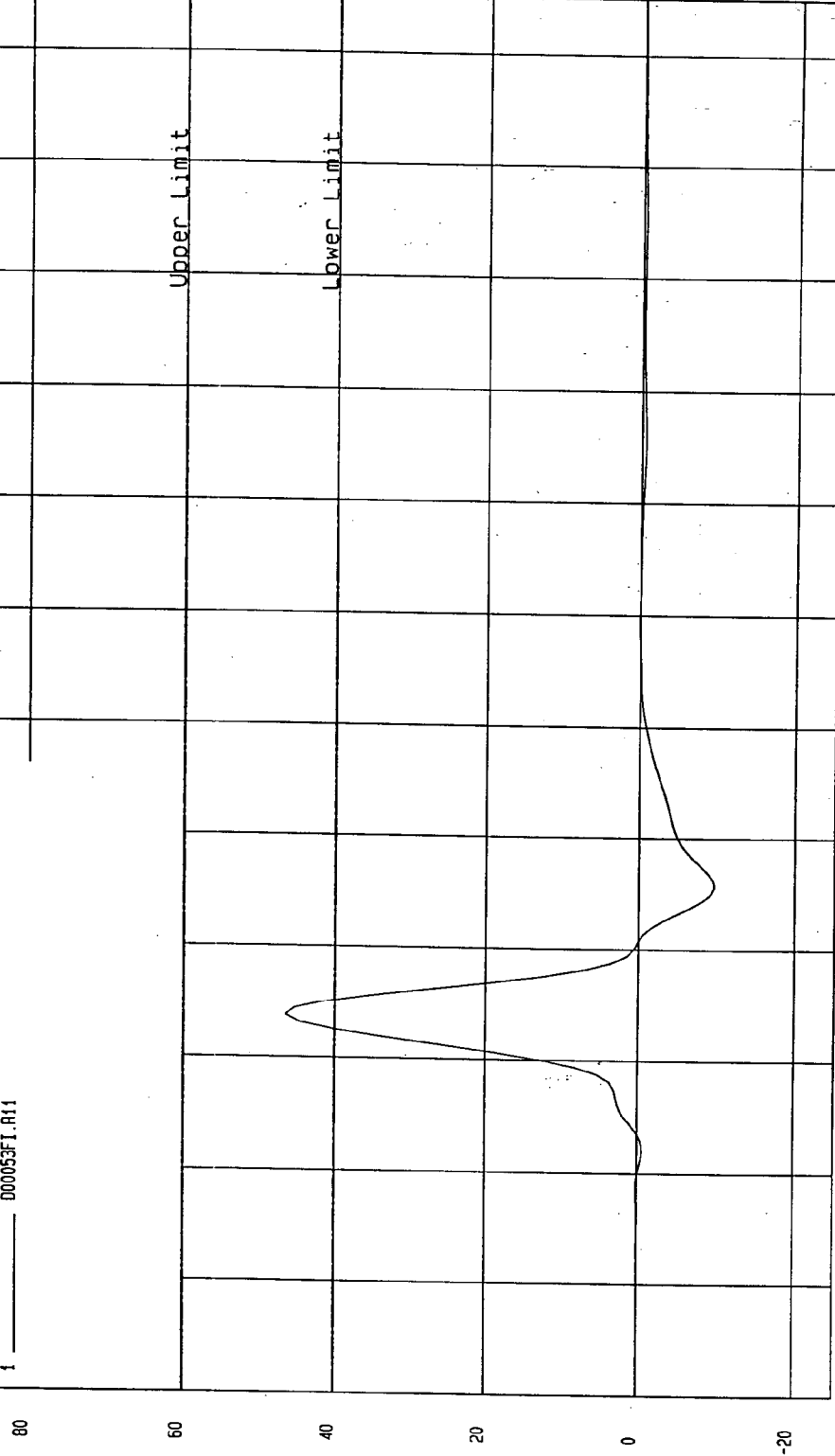
TECHNICIAN: Tim Allen

APPROVED BY: David Winkelbauer

TEST: Dummy Calibration - Pelvis Impact TEST DATE: 01-18-2000 - 10:57:06
 COMPONENT: Dummy # 037 Velocity: 14.012 FT/SEC 4.27 M/SEC
 Minimum = -9.60 G's at 45.6 msec Maximum = 46.62 G's at 33.7 msec

PELVIS ACCELERATION

1 ——— D00053FI.R11



MCA Research
 01-25-2000 10:13

MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

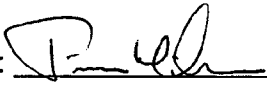
DATE: January 14, 2000

DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00054

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	23
FORCE @ 12.7 mm	104 - 162	141
FORCE @ 19.0 mm	163 - 222	191
FORCE @ 25.4 mm	222 - 280	246
FORCE @ 33 mm	325 - 391	332

TEST MEETS SPECIFICATIONS

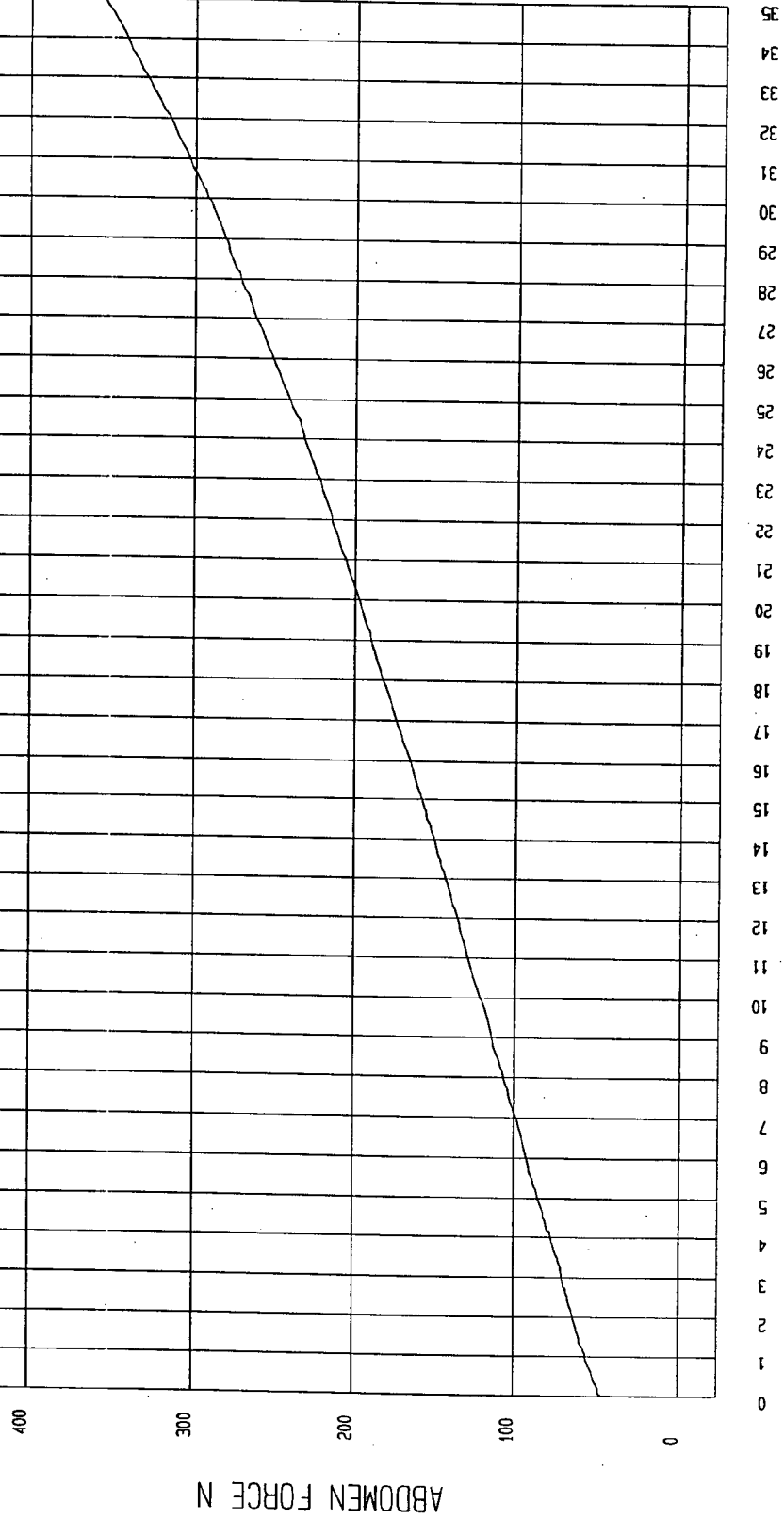
TECHNICIAN: 

APPROVED BY: 

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-14-2000 - 08:52:53

COMPONENT: DUMMY # 037

ABDOMEN FORCE as a function of DISPLACEMENT



MSA Research
01-16-2000 11:12

DISPLACEMENT mm

MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

DATE: January 14, 2000

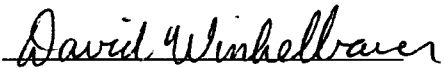
DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00055

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	25
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	107.3
FORCE @ 30°	151.2 - 204.6	160.0
FORCE @ 40°	204.6 - 258.0	212.7
RETURN ANGLE	12° maximum	6

TEST MEETS SPECIFICATIONS

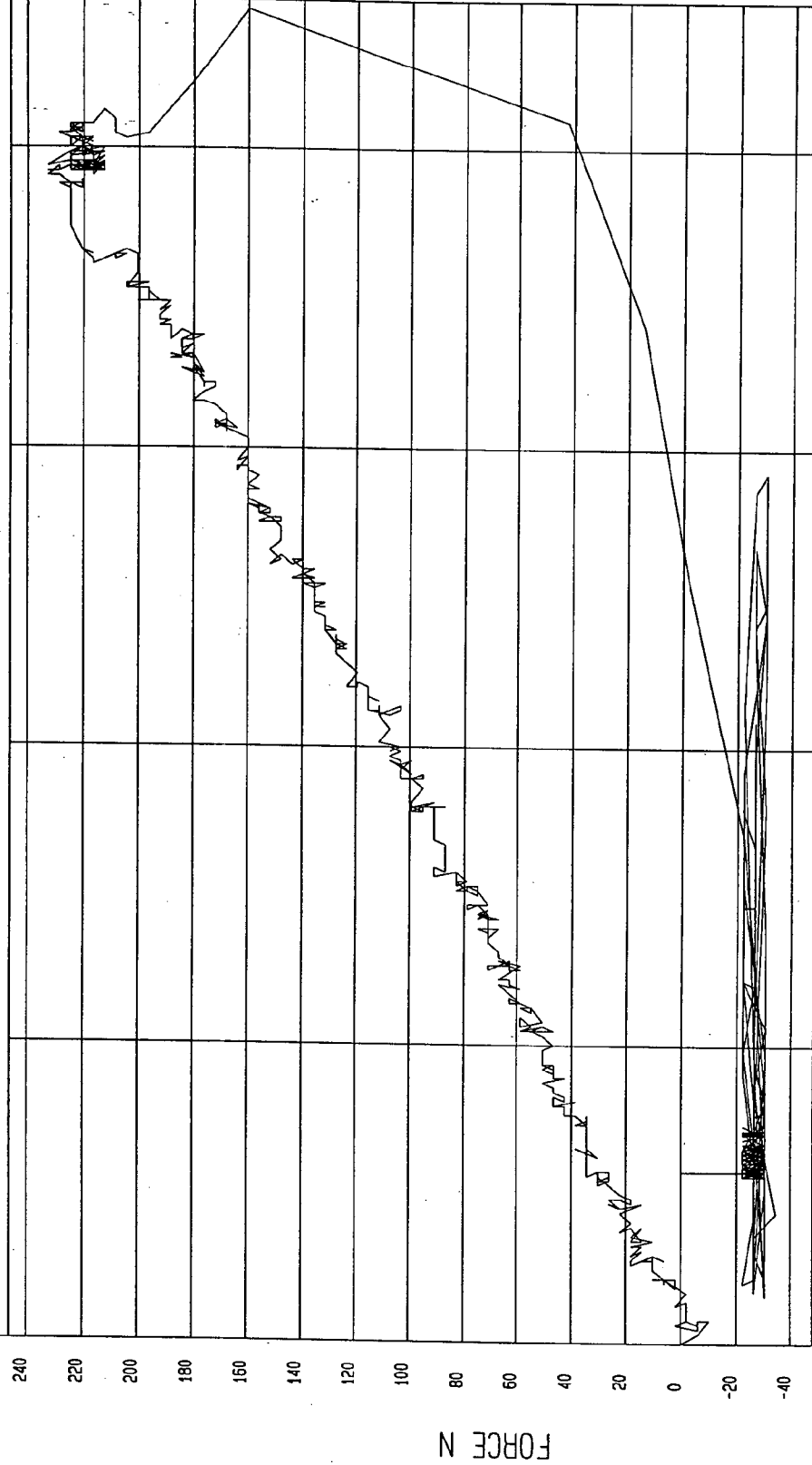
TECHNICIAN: 

APPROVED BY: 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-14-2000 - 09:54:01

COMPONENT: DUMMY # 037

FORCE as a function of TORSO ROTATION



40
30
20
10
0
-20
-40

TORSO ROTATION DEGREES

NSA Research
01-18-2000 11:14

POST-TEST CERTIFICATION DATA

Dummy Serial Number: 036

Calibration Test Results Summary

Dummy Serial Number: 036

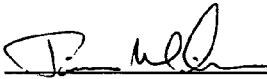
Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NO.: 036DATE OF VERIFICATION: January 24, 2000

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	902
RH - Rib Height (mm)	501 - 521	507
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	235
KV - Knee Pivot From Back Line (mm)	511 - 526	519
SW - Knee Pivot to Floor (mm)	490 - 505	494
HW - Hip Width (mm)	356 - 391	370

TECHNICIAN: APPROVED BY: 

MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

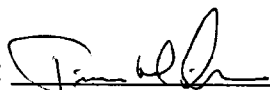
DATE: January 24, 2000

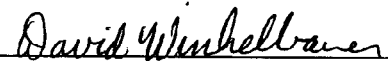
DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00152

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	21
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46	44
LOWER RIB (g's)	37 - 46	46
LOWER SPINE (g's)	15 - 22	20

TEST MEETS SPECIFICATIONS

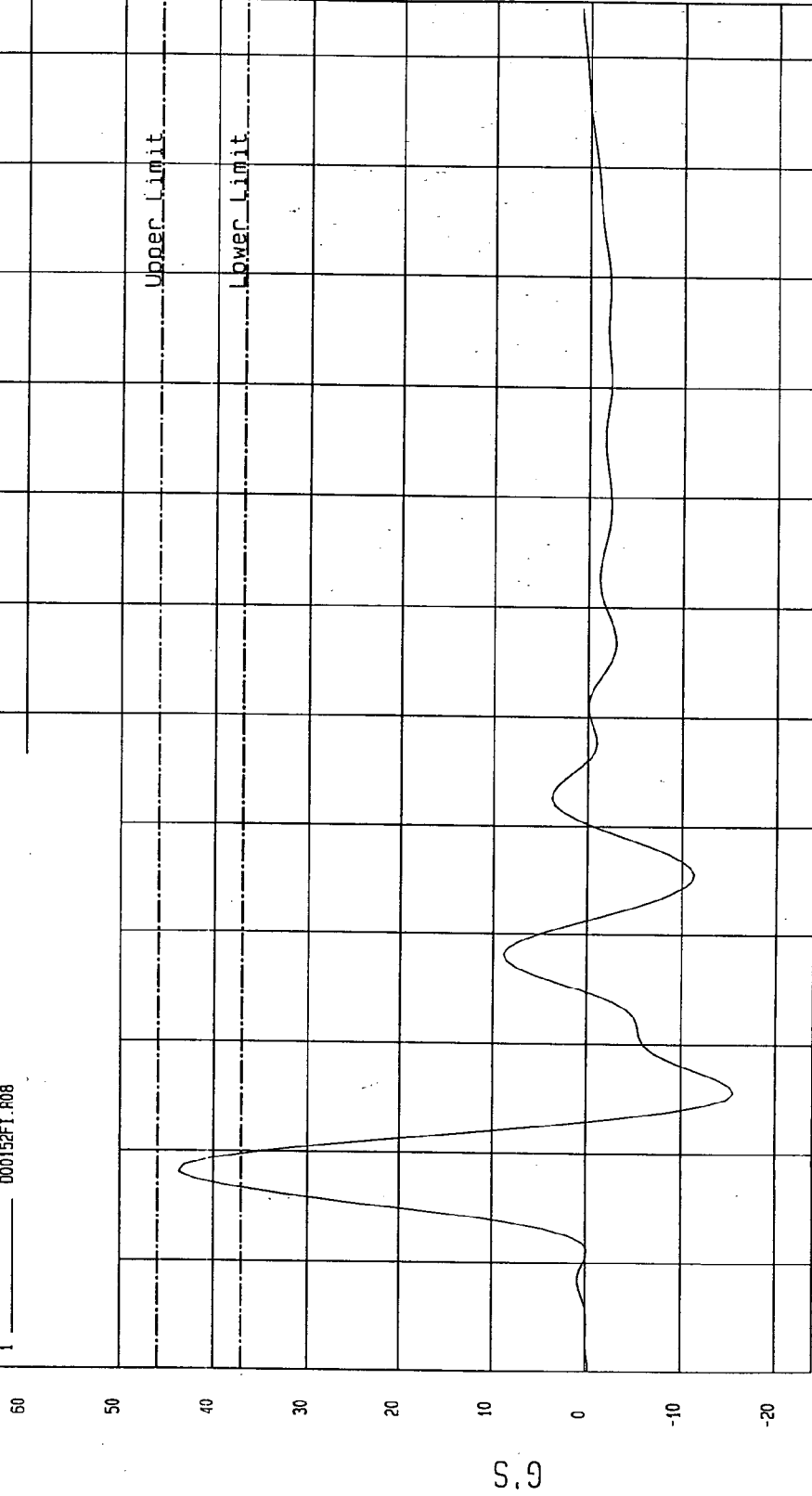
TECHNICIAN: 

APPROVED BY: 

TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-24-2000 - 11:24:54
 COMPONENT: Dummy #036 Velocity: 14.015 FT/SEC 4.27 M/SEC
 Minimum = -15.52 G'S at 25.6 msec Maximum = 43.75 G'S at 18.1 msec

UPPER RIB ACCELERATION

1 ——— 000152FI.R08



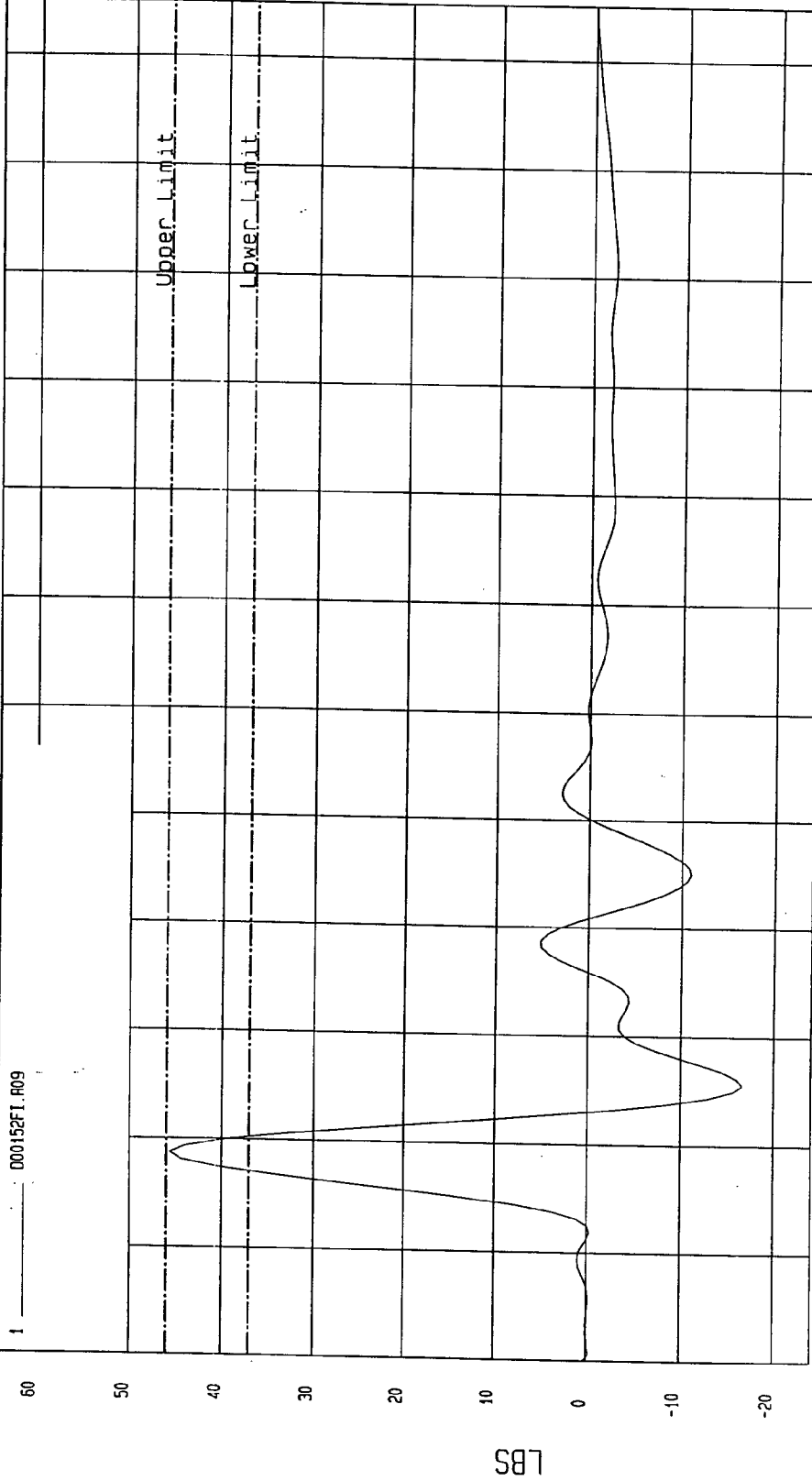
WCA Research
 01-24-2000 11:31

TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-24-2000 - 11:24:54

COMPONENT: Dummy #036 Velocity: 14.015 FT/SEC 4.27 M/SEC

Minimum = -16.50 LBS at 25.6 msec Maximum = 45.61 LBS at 18.7 msec

LOWER RIB ACCELERATION

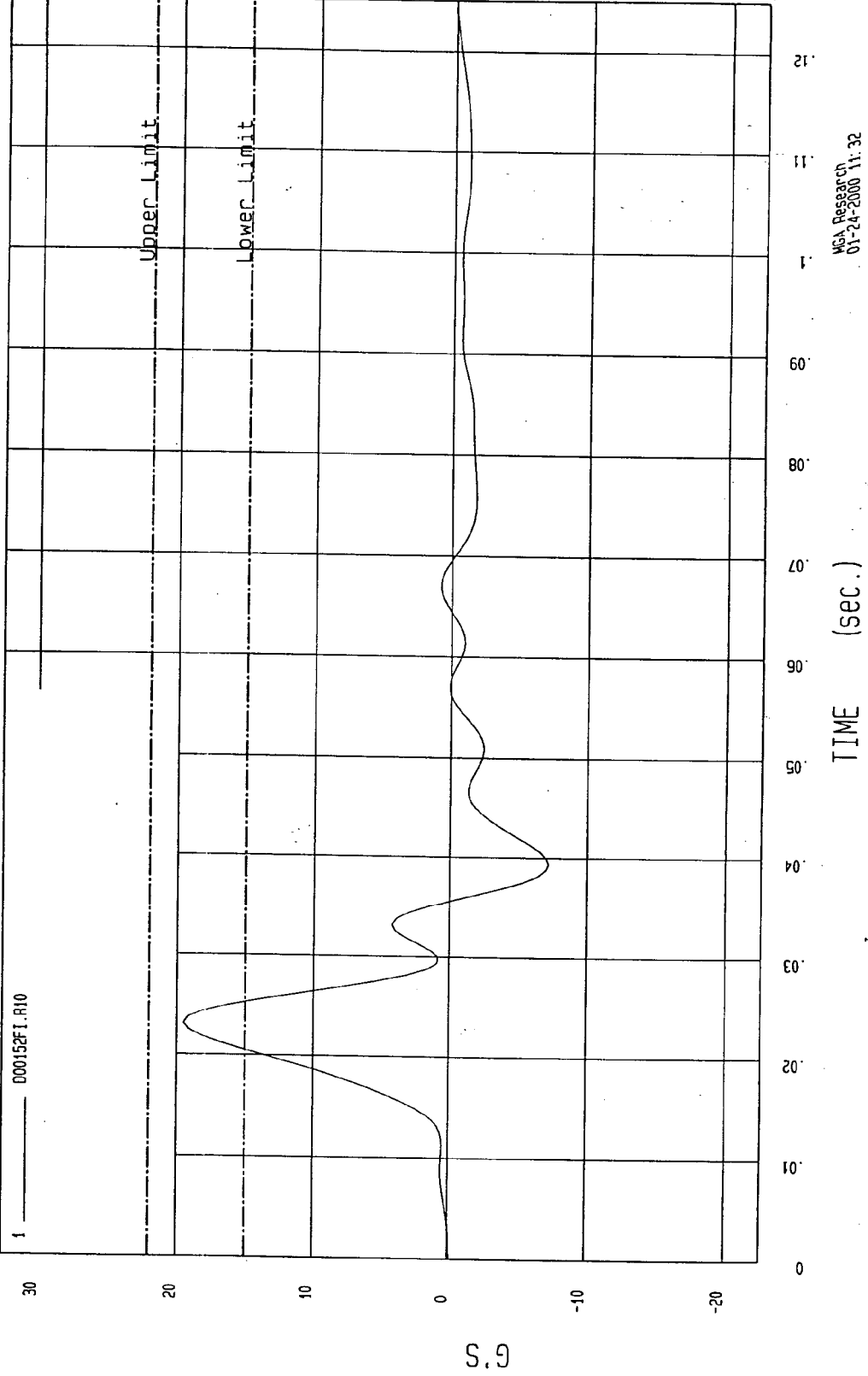


MGA Research
01-24-2000 11:34

TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-24-2000 - 11:24:54
COMPONENT: Dummy #036 Velocity: 14.015 FT/SEC 4.27 M/SEC

Minimum = -7.18 G'S at 39.3 msec Maximum = 19.51 G'S at 23.1 msec

LOWER SPINE ACCELERATION



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00153

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70%	21
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	45

TEST MEETS SPECIFICATIONS

TECHNICIAN

T. V. H.

APPROVED BY

David W. H. B.

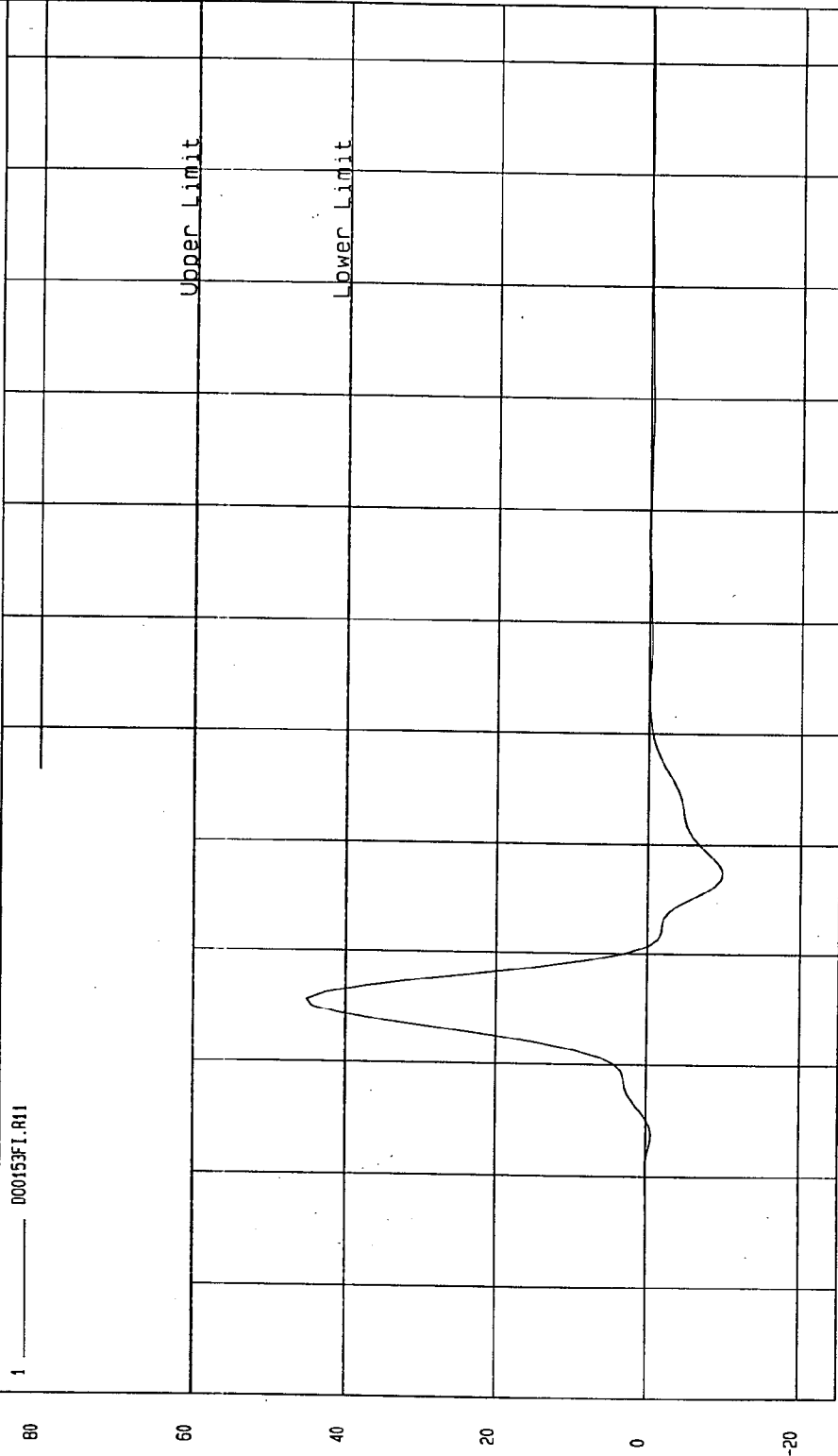
TEST: Dummy Calibration - Pelvis Impact TEST DATE: 01-24-2000 - 11:31:07

COMPONENT: Dummy #036 Velocity: 14.06 FT/SEC 4.29 M/SEC

Minimum = -9.79 G's at 47.5 msec
Maximum = 45.10 G's at 35.6 msec

PELVIS ACCELERATION

1 _____ 000153FL.R11



MCA Research
01-24-2000 11:32

MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

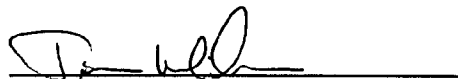
DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00154

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	25
FORCE @ 12.7 mm	104 - 162	147
FORCE @ 19.0 mm	163 - 222	201
FORCE @ 25.4 mm	222 - 280	257
FORCE @ 33 mm	325 - 391	346

TEST MEETS SPECIFICATIONS

TECHNICIAN



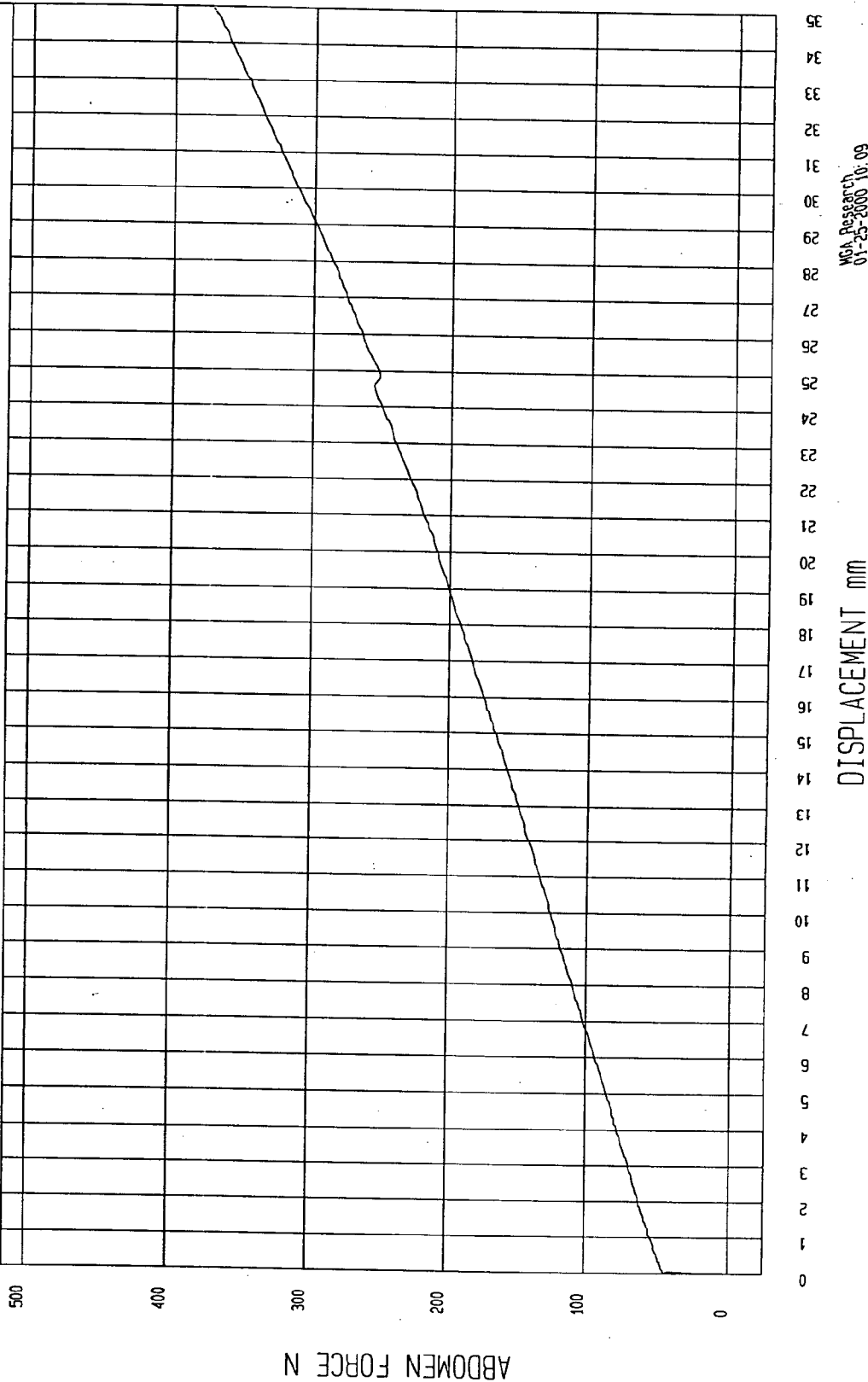
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-24-2000 - 16:11:37

COMPONENT: DUMMY # 036

ABDOMEN FORCE as a function of DISPLACEMENT



M&A Research
01-25-2000 10:09

MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

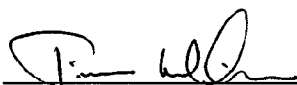
DUMMY SERIAL NUMBER: 036

TEST NUMBER: D00155

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	105.1
FORCE @ 30°	151.2 - 204.6	153.7
FORCE @ 40°	204.6 - 258.0	210.3
RETURN ANGLE	12° maximum	3

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-24-2000 - 14:32:30

COMPONENT: DUMMY # 036

FORCE as a function of TORSO ROTATION

220

200

180

160

140

120

100

80

60

40

20

0

-20

-40

FORCE N

0

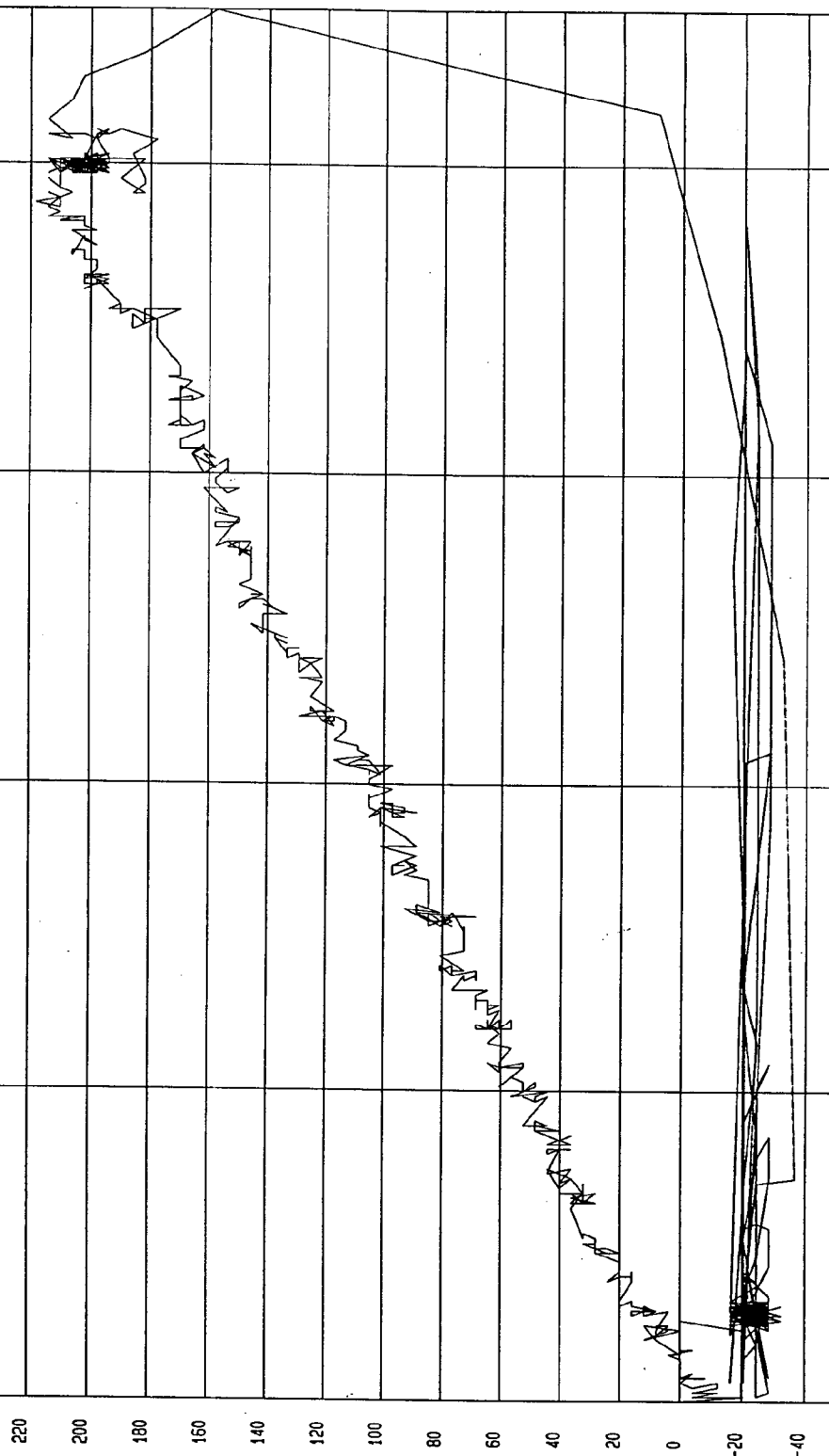
10

20

30

40

TORSO ROTATION DEGREES

MCA Research
01-25-2000 10:10

POST-TEST CERTIFICATION DATA

Dummy Serial Number: 037

Calibration Test Results Summary

Dummy Serial Number: 037

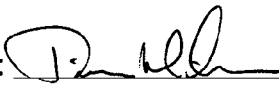
Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NO.: 037DATE OF VERIFICATION: January 24, 2000

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	903
RH - Rib Height (mm)	501 - 521	510
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	237
KV - Knee Pivot From Back Line (mm)	511 - 526	522
SW - Knee Pivot to Floor (mm)	490 - 505	493
HW - Hip Width (mm)	356 - 391	378

MEASUREMENTS BY: APPROVED BY: 

MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

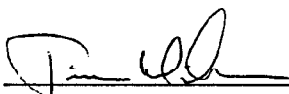
DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00162

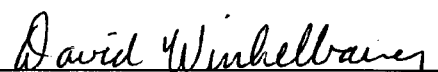
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46	46
LOWER RIB (g's)	37 - 46	43
LOWER SPINE (g's)	15 - 22	20

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

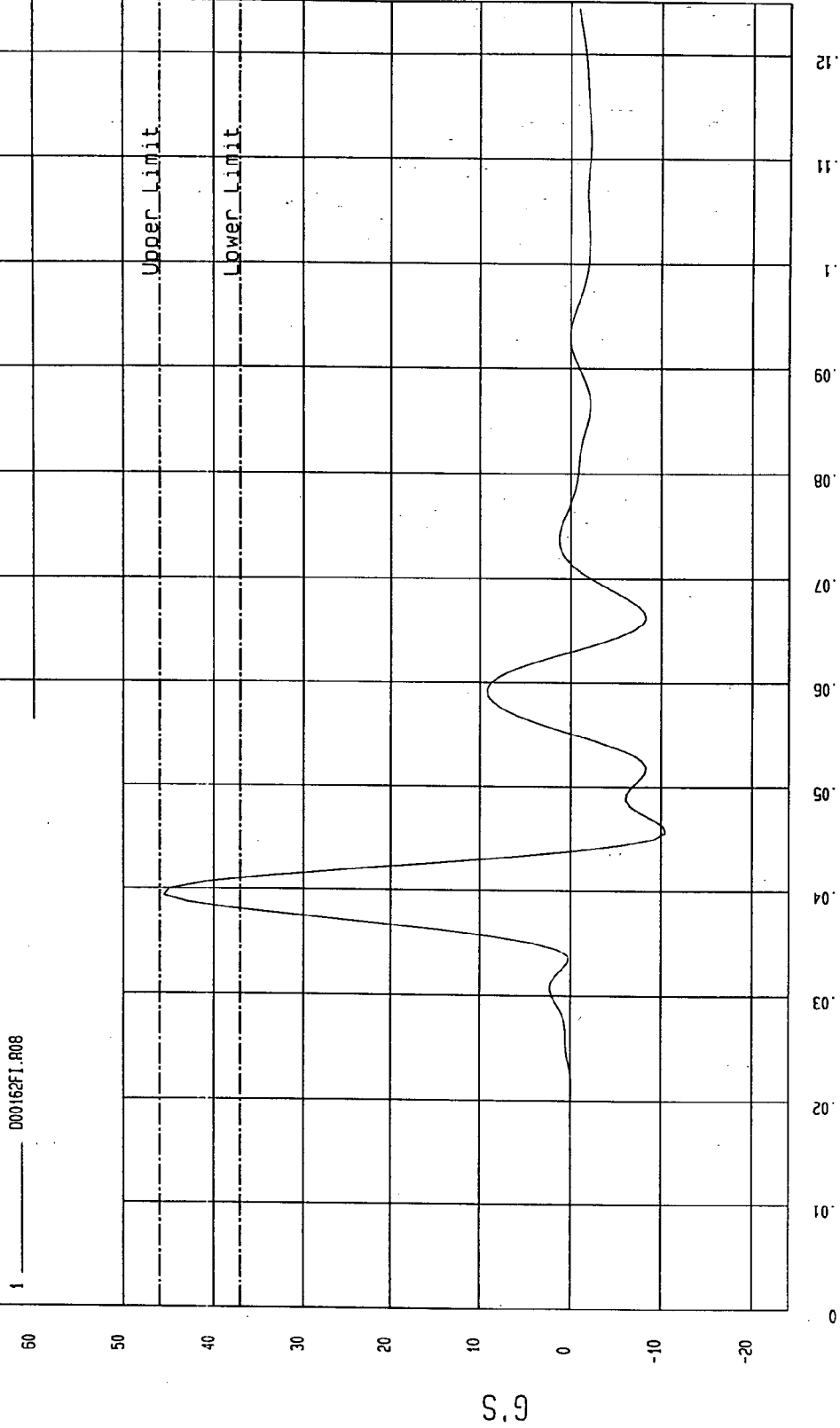


TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-24-2000 - 11:56:52

COMPONENT: Dummy #037 Velocity: 14.071 FT/SEC 4.29 M/SEC

Minimum = -10.45 G'S at 45.6 msec Maximum = 45.59 G'S at 39.3 msec

UPPER RIB ACCELERATION



TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-24-2000 - 11:56:52

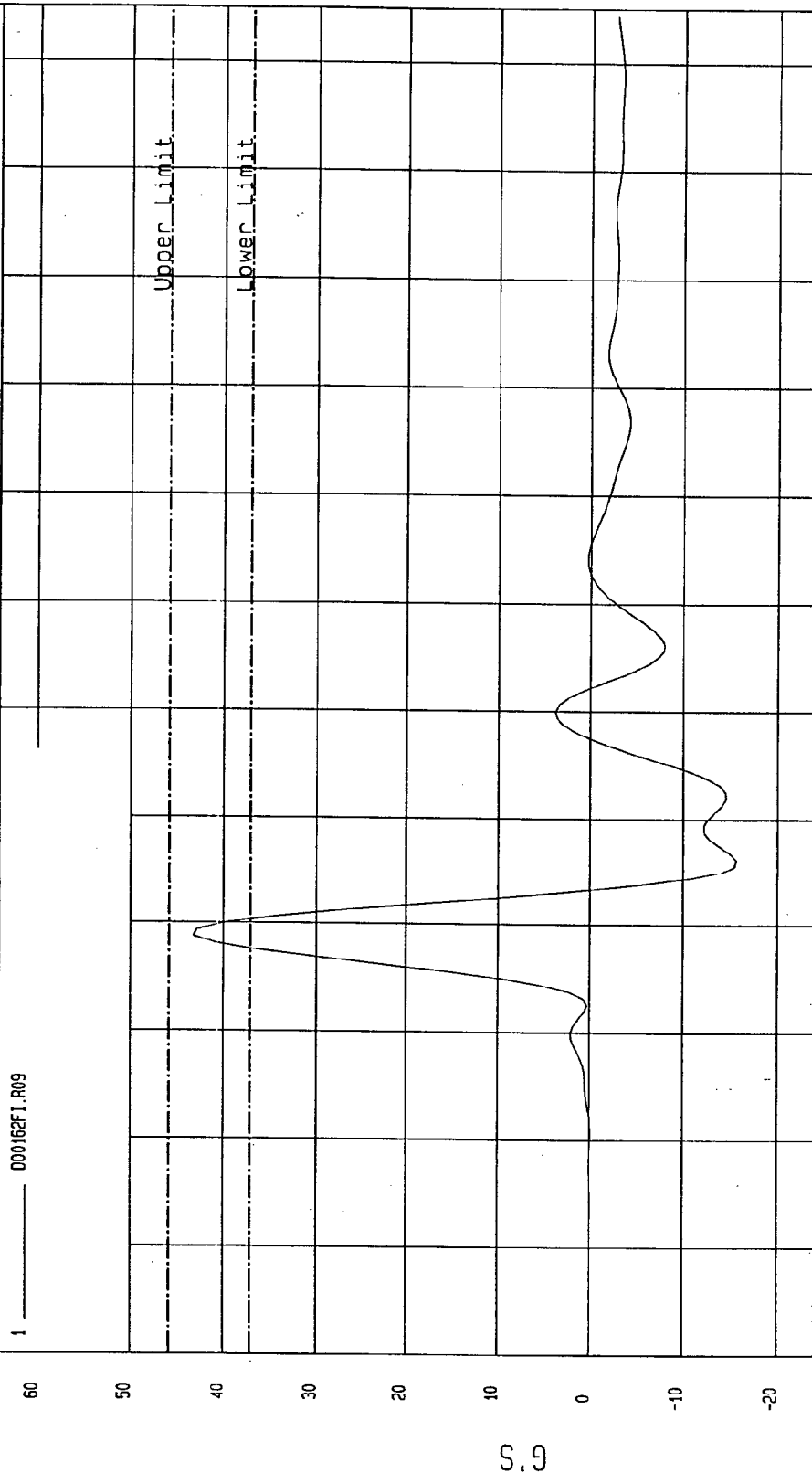
COMPONENT: Dummy #037 Velocity: 14.071 FT/SEC 4.29 M/SEC

Minimum = -15.63 G'S at 46.2 msec

Maximum = 43.34 G'S at 38.7 msec

LOWER RIB ACCELERATION

1 ——— 000162F1.R09

NCA Research
01-24-2000 12:06

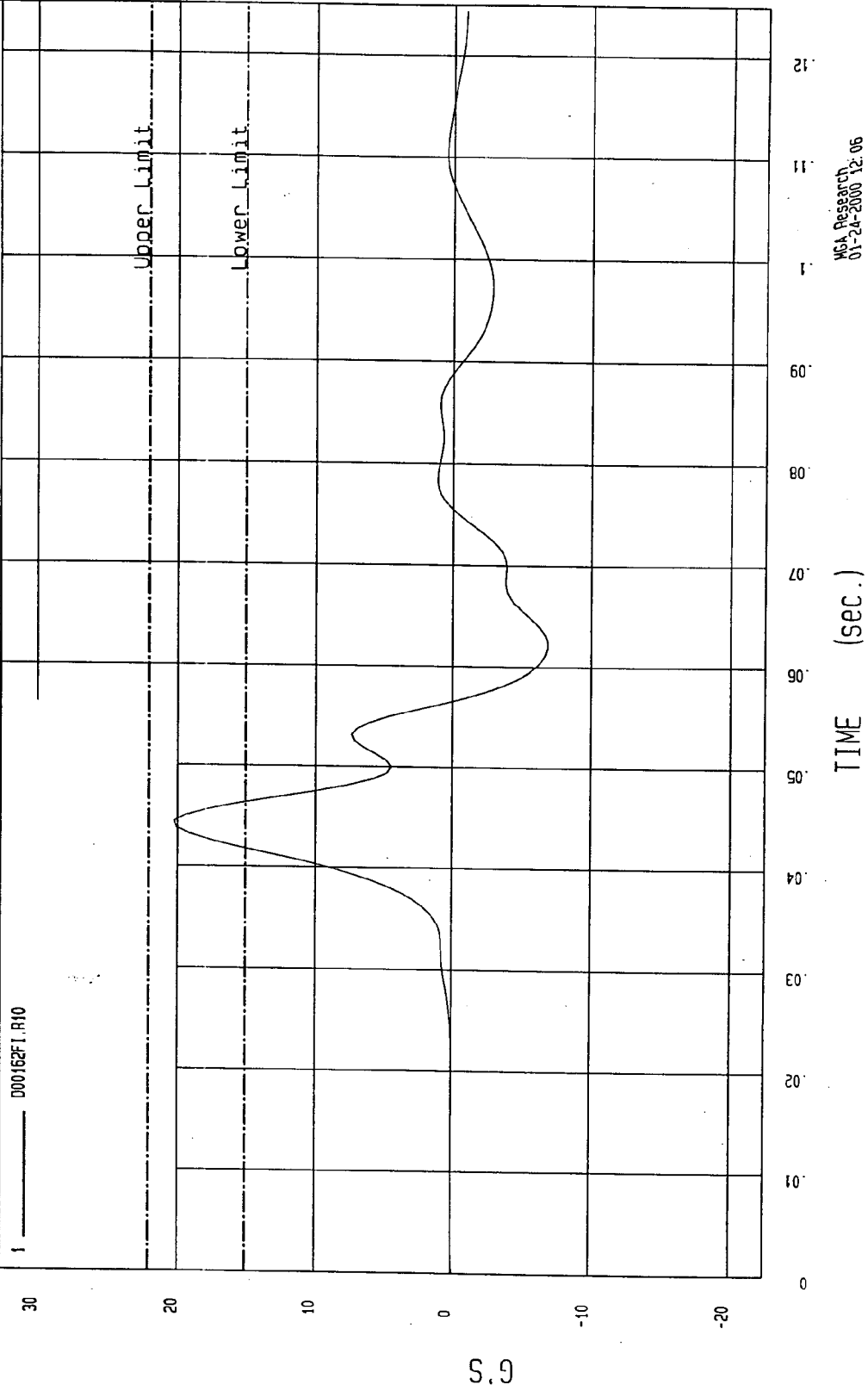
TEST: Dummy Calibration - Thorax Impact TEST DATE: 01-24-2000 - 11:56:52

COMPONENT: Dummy #037 Velocity: 14.071 FT/SEC 4.29 M/SEC

Minimum = -6.94 G'S at 52.5 msec

Maximum = 20.26 G'S at 44.3 msec

LOWER SPINE ACCELERATION



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00163

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	22
PROBE SPEED (m/s)	4.27 - 4.33	4.28
PELVIS ACCELERATION (g's)	40 - 60	44

TEST MEETS SPECIFICATIONS

TECHNICIAN

Jim Ullrich

APPROVED BY

David Winkelbauer

TEST: Dummy Calibration - Pelvis Impact TEST DATE: 01-24-2000 - 12:05:58

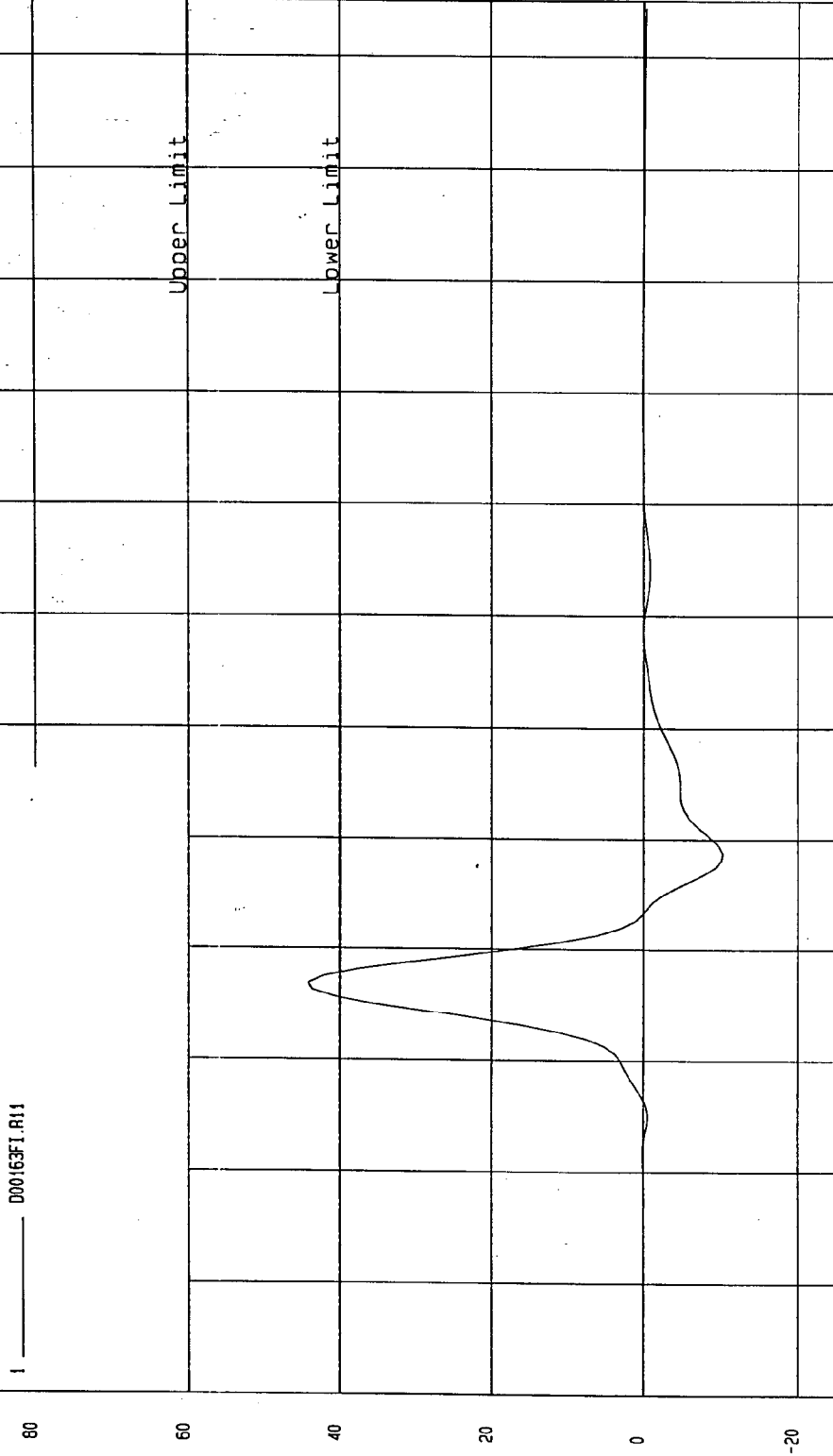
COMPONENT: Dummy #037 Velocity: 14.049 FT/SEC 4.28 M/SEC

Minimum = -10.20 G'S at 48.7 msec

Maximum = 44.37 G'S at 36.8 msec

PELVIS ACCELERATION

1 _____ D00163F1.R11



TIME (sec.)

NGA Research
01-24-2000 12:06

MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00164

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	25
FORCE @ 12.7 mm	104 - 162	144
FORCE @ 19.0 mm	163 - 222	192
FORCE @ 25.4 mm	222 - 280	256
FORCE @ 33 mm	325 - 391	350

TEST MEETS SPECIFICATIONS

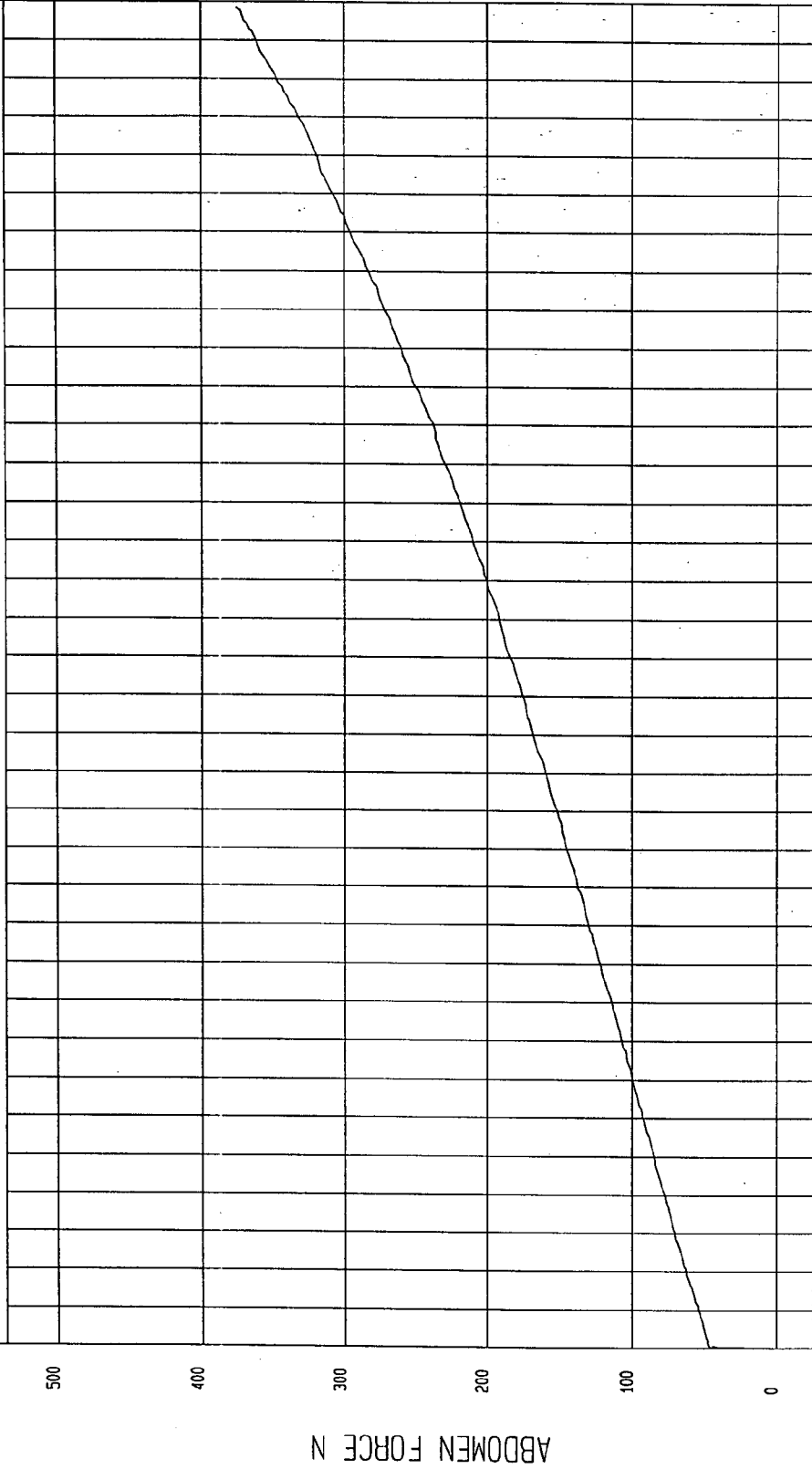
TECHNICIAN Jim With

APPROVED BY David Winkler

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-24-2000 - 16:15:36

COMPONENT: DUMMY # 037

ABDOMEN FORCE as a function of DISPLACEMENT



MCA Research
01-25-2000 10:09

DISPLACEMENT mm

MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

DATE: January 24, 2000

DUMMY SERIAL NUMBER: 037

TEST NUMBER: D00165

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0
RELATIVE HUMIDITY (%)	10 - 70	21
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	110.9
FORCE @ 30°	151.2 - 204.6	163.5
FORCE @ 40°	204.6 - 258.0	216.1
RETURN ANGLE	12° maximum	3

TEST MEETS SPECIFICATIONS

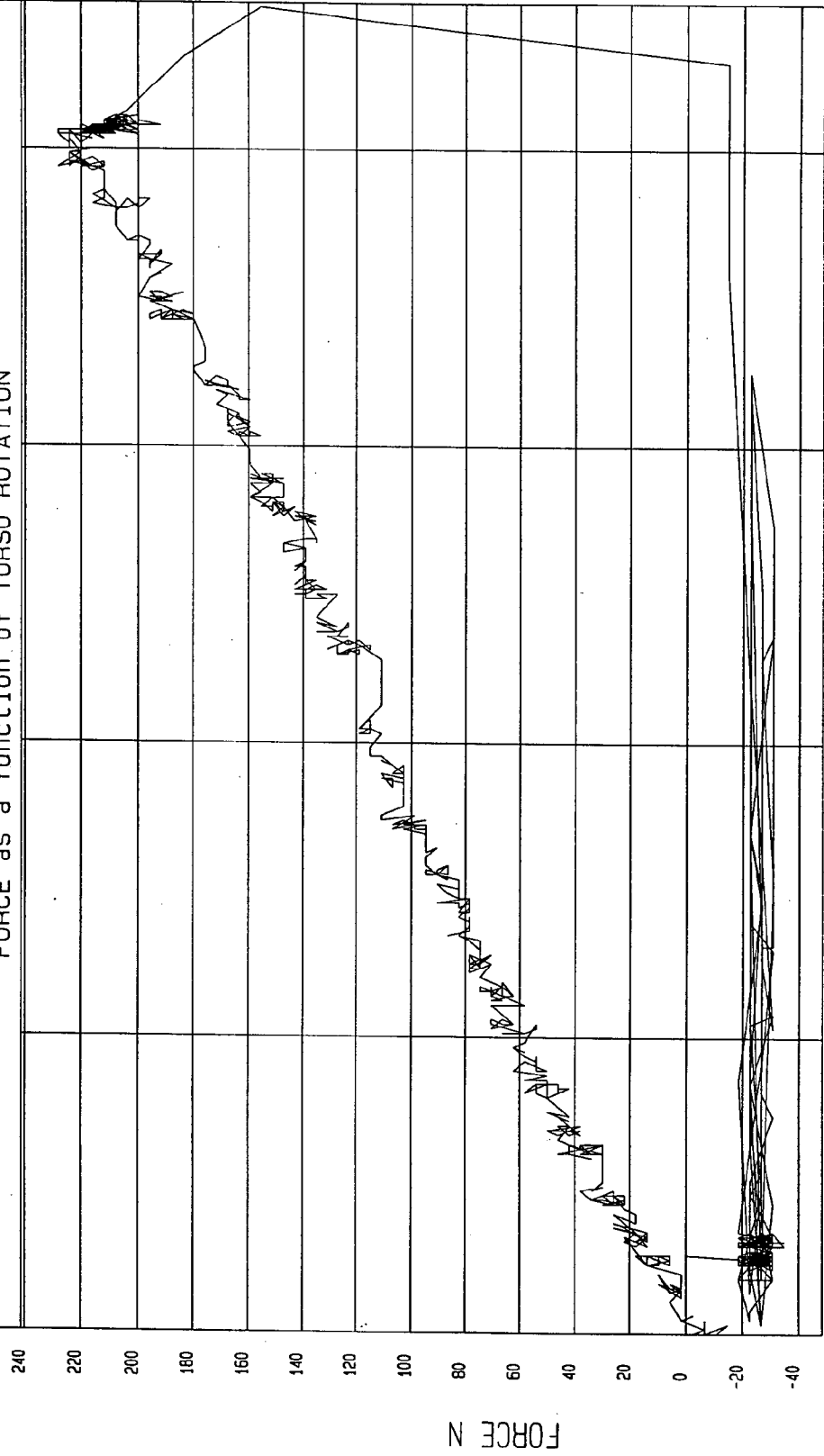
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-24-2000 - 15:04:34

COMPONENT: DUMMY # 037

FORCE as a function of TORSO ROTATION



MGA Research
01-25-2000 10:10

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Dummy Serial Number: 036

Inspected By: Tim Michnay

Date: January 24, 2000

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

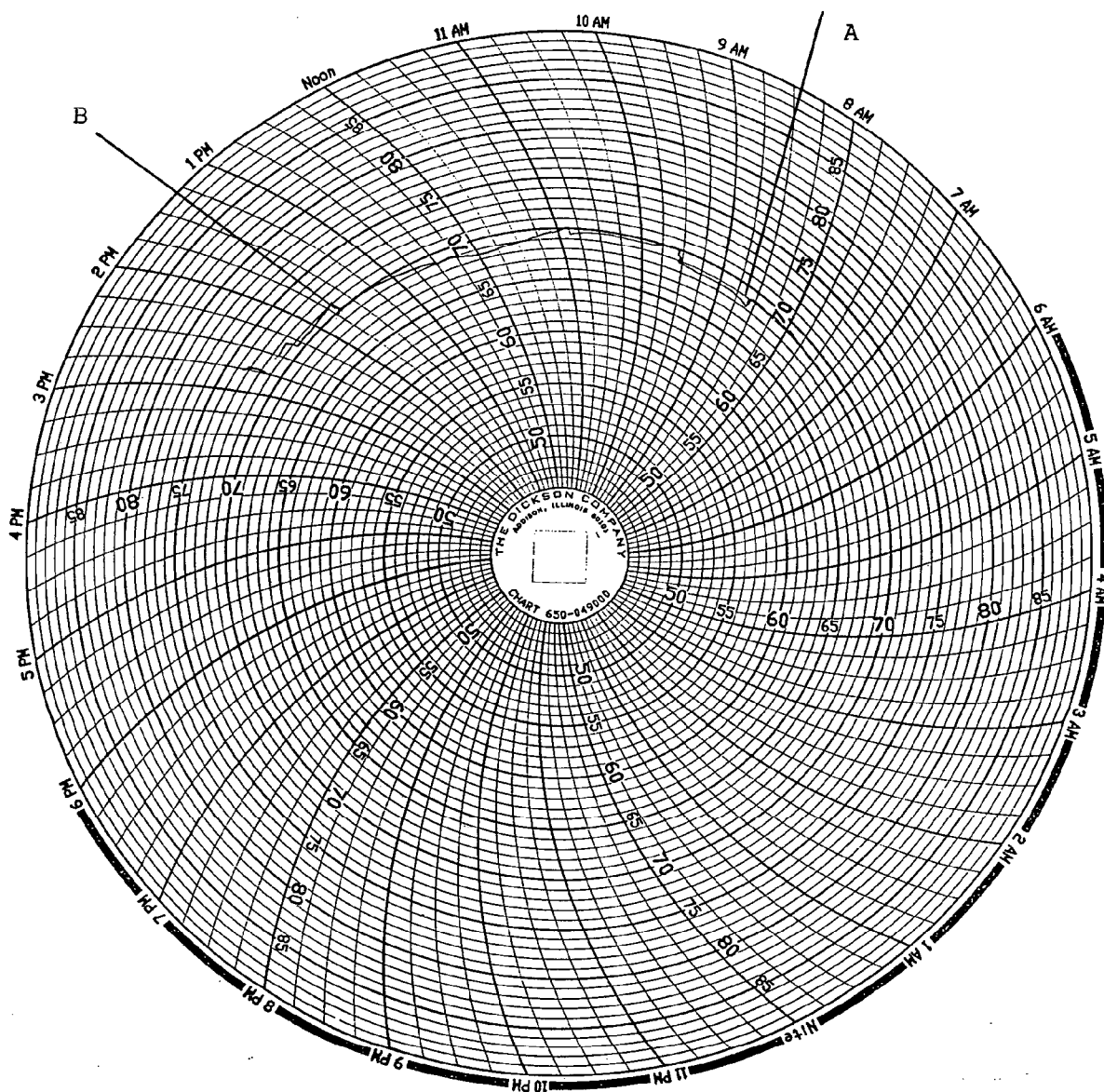
Dummy Serial Number: 037

Inspected By: Tim Michnay

Date: January 24, 2000

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

VEHICLE AND DUMMY TEMPERATURE

A = Dummies installed in vehicle

B = Test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR DRIVER DUMMY NO. 036

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AKAF3	Endevco	August 2, 1999
Lower Rib Y	AGP53	Endevco	July 30, 1999
Lower Spine Y	J12450	Endevco	August 2, 1999
Pelvis Y	AP0G2	Endevco	August 2, 1999
Upper Rib Redundant Y	ALCN9	Endevco	August 2, 1999
Lower Rib Redundant Y	AHTC3	Endevco	July 30, 1999
Lower Spine Redundant Y	J12461	Endevco	August 2, 1999
Pelvis Redundant Y	AP138	Endevco	August 2, 1999

INSTRUMENTS FOR LEFT REAR PASSENGER DUMMY NO. 037

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AJ412	Endevco	August 2, 1999
Lower Rib Y	AH0N9	Endevco	July 30, 1999
Lower Spine Y	AJ9P7	Endevco	July 30, 1999
Pelvis Y	J18260	Endevco	July 30, 1999
Upper Rib Redundant Y	AHRP6	Endevco	July 30, 1999
Lower Rib Redundant Y	AHT20	Endevco	July 30, 1999
Lower Spine Redundant Y	AJ462	Endevco	July 30, 1999
Pelvis Redundant Y	AKAH1	Endevco	July 30, 1999

VEHICLE INSTRUMENT CALIBRATION

VEHICLE AND MDB ACCELEROMETERS		
	SERIAL NO.	CALIBRATION DATE
Moving Barrier CG X	J10-E05	August 17, 1999
Moving Barrier CG Y	J04-F10	August 16, 1999
Moving Barrier CG Z	I18-E18	August 17, 1999
Moving Barrier Rear Axle X	C25-A17	August 6, 1999
Moving Barrier Rear Axle Y	I25-J12	August 6, 1999
Left Mid A-Post Y	F11-G08	August 6, 1999
Left Lower A-Post Y	J10-E12	August 17, 1999
Left Middle B-Post Y	E10-F03	August 6, 1999
Left Lower B-Post Y	F20-G10	November 5, 1999
Rear Floorpan Above Axle X	I26-D15	August 17, 1999
Rear Floorpan Above Axle Y	C25-A09	August 17, 1999
Rear Floorpan Above Axle Z	F18-G07	November 5, 1999
Driver Seat Track Y	I26-D04	September 24, 1999
Right Side Sill at Front Seat X	J10-E18	August 17, 1999
Right Side Sill at Front Seat Y	C18-G09	November 22, 1999
Right Side Sill at Front Seat Z	J06-D19	August 5, 1999
Right Side Sill at Rear Seat X	G01-J12	August 17, 1999
Right Side Sill at Rear Seat Y	G08-B07	August 17, 1999
Right Side Sill at Rear Seat Z	I25-J07	August 17, 1999
Left Side Sill at Front Seat Y	E10-F20	September 24, 1999

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE AND MDB ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Side Sill at Rear Seat Y	E24-G08	Entran	November 22, 1999
Rear Occupant Compartment Y	K11-J12	Entran	November 22, 1999
Vehicle CG X	I25-J18	Entran	August 17, 1999
Vehicle CG Y	G01-J14	Entran	August 17, 1999
Vehicle CG Z	I26-D17	Entran	August 17, 1999

Note: All Endevco accelerometers are Model No. 7264-2000. All Entran accelerometers are Model No. EGE-72